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**FM 3-01.85** (FM 44-85)

# PATRIOT BATTALION AND BATTERY OPERATIONS

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# Patriot Battalion and Battery Operations

## Contents

| | | Page |
|---|---|---|
| | **PREFACE** | v |
| **Chapter 1** | **OVERVIEW** | 1-1 |
| | Army Mission | 1-1 |
| | ADA Mission | 1-1 |
| | ADA Role | 1-1 |
| | Patriot Mission | 1-2 |
| | Patriot Roles | 1-2 |
| **Chapter 2** | **THREAT** | 2-1 |
| | Contingency Theater Threat | 2-1 |
| | Threat During Lodgment | 2-5 |
| | Threat During Operations | 2-6 |
| **Chapter 3** | **PATRIOT BATTALION PLANNING** | 3-1 |
| | AMD Planning Overview | 3-1 |
| | Patriot Battalion Planning | 3-5 |
| **Chapter 4** | **FORCE-PROJECTION OPERATIONS** | 4-1 |
| | Force Projection Process | 4-1 |
| | Mobilization | 4-2 |
| | Deployment | 4-4 |
| | Employment | 4-5 |
| | Redeployment | 4-7 |
| | Sustainment | 4-8 |

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| | | |
|---|---|---|
| **Chapter 5** | **OPERATIONS** | 5-1 |
| | Offensive Operations | 5-1 |
| | Defensive Operations | 5-6 |
| | Defense Designs | 5-7 |
| | TBM Defenses | 5-9 |
| | Stability Operations and Support Operations | 5-11 |
| | Remote Launch | 5-11 |
| | AMD Task Force Operations | 5-13 |
| | Command, Control, Communications and Intelligence | 5-19 |
| | TBM Operational Engagement Effectiveness | 5-21 |
| | Integrated Firing Doctrine Principles | 5-24 |
| **Chapter 6** | **PATRIOT COMBAT SERVICE SUPPORT** | 6-1 |
| | Patriot Support Concept | 6-1 |
| | Organizations and Functions | 6-1 |
| | Planning | 6-8 |
| | Operations | 6-9 |
| | Supply | 6-11 |
| | Categories of Supplies | 6-12 |
| | Classes of Supply | 6-13 |
| | Maintenance | 6-20 |
| | Transportation | 6-23 |
| | Field Services | 6-23 |
| | Rear Area Base Security | 6-24 |
| | Reconstitution | 6-27 |
| **Appendix A** | **ORGANIZATION** | A-1 |
| | Patriot Battalion | A-1 |
| | Headquarters and Headquarters Battery | A-1 |
| | Patriot Battery (Fire Unit) | A-4 |
| **Appendix B** | **PATRIOT SYSTEM EQUIPMENT** | B-1 |
| | System Overview | B-1 |
| | Physical Description of Major Items | B-3 |
| | Tactical Equipment Weights and Dimensions | B-14 |

| | | |
|---|---|---|
| **Appendix C** | **COMMUNICATIONS** | C-1 |
| | Overview | C-1 |
| | Battalion Communications | C-2 |
| | Battery Communications | C-8 |
| | Air and Missile Defense Task Force Communications | C-11 |
| | Patriot Communications Planning | C-14 |
| | Standardization | C-17 |
| | System Initialization | C-20 |
| | Data Link Considerations | C-20 |
| | Tactical Considerations | C-21 |
| | Recommendations | C-22 |
| **Appendix D** | **INTELLIGENCE PREPARATION OF THE BATTLESPACE** | D-1 |
| | Role of the Commander and Staff in IPB | D-1 |
| | IPB Process | D-1 |
| | Battlespace's Effects On Enemy And Friendly Capabilities | D-10 |
| **Appendix E** | **SAFETY** | E-1 |
| | Responsibilities | E-1 |
| | Identifying and Assessing Safety Issues | E-1 |
| | Patriot System Safety | E-2 |
| | Vehicle Movement and Convoys | E-5 |
| | AMD Task Force Safety | E-6 |
| **Appendix F** | **TRANSPORTABILITY** | F-1 |
| | Transportability Overview | F-1 |
| | C-5 Characteristics. | F-3 |
| | C-17 Characteristics | F-3 |
| | MEP Air Transportability | F-3 |
| | Special Air Transportability Requirements | F-5 |
| **Appendix G** | **RECONNAISSANCE, SELECTION, AND OCCUPATION OF POSITION** | G-1 |
| | Preparation For Movement | G-1 |
| | Methods Of Reconnaissance | G-2 |
| | Establishing A Team | G-3 |
| | RSOP Team | G-4 |

Movement Warning Order…… G-6
Ground/Site Reconnaissance…… G-6
Laying Out The Position…… ... G-7
Equipment Considerations…… G-8
Occupy, Organize And Improve Positions…… .. G-11
**GLOSSARY**…… Glossary-1
**BIBLIOGRAPHY**…… Bibliography-1
**INDEX**…… Index-1

# Preface

This field manual provides doctrinal how-to-fight guidance for the Patriot battalion and battery, and is intended primarily for battalion commanders, staff officers, battery commanders, platoon leaders, and tactical directors.

This FM is applicable to all theaters of operations. It focuses on Patriot's role in the projection of land and air combat power. Chapters address Patriot's role in the joint battle, the threat, battalion planning, force-projection operations, offensive and defensive operations, and combat service support. Appendices cover unit organization, equipment, communications, intelligence preparation of the battlespace, safety, transportability, and reconnaissance, selection, and occupation of a position.

This FM should be used in conjunction with FM 3-01.87, which describes the tactics, techniques and procedures required to execute Patriot operations and exploit Patriot's combat power. Classified capabilities and planning data for the Patriot system are found in (S) FM 3-01.13 (S/NF).

This publication implements the following international standardization agreements:

| ISA | TITLE | EDITION |
|---|---|---|
| STANAG 2175 | Classification and Designation of Flat Wagons Suitable for Transporting Military Equipment | 3 |
| STANAG 2832 | Dimensional Restrictions for the Transport of Military Equipment by Rail on European Railways | 3 |
| STANAG 3700 | NATO Tactical Air Doctrine--ATP-33 (B) | 5 |
| STANAG 3805 | Doctrine for Airspace Control in Times of Crisis and War--ATP-40 (B) | 5 |
| STANAG 3880 | Counter Air Operations--ATP-42 (B) | 3 |

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Unless this publication states otherwise, masculine nouns or pronouns do not refer exclusively to men.

## Chapter 1

# Overview

This chapter discusses the missions of the Army and air defense artillery as well as the role ADA plays in protecting the force. It also describes the Patriot mission and the roles Patriot plays in supporting the various types of air and missile defense (AMD) operations.

## ARMY MISSION

1-1. The mission of the Army is to fight and win the nation's wars, defend the United States and its territories, and support national policies and objectives articulated in the National Security Strategy and National Military Strategy.

1-2. The Army accomplishes this mission through a force structure comprised of combat, combat support, and combat service support forces.

- Combat forces provide destructive capabilities to defeat the enemy. These forces include, armor, aviation, infantry, and Special Forces units.
- Combat support forces provide fire support and operational assistance to combat forces. These support forces include the ADA, field artillery, engineers, chemical, military intelligence, military police, and signal units.
- Combat service support forces provide essential support required to sustain operations throughout a campaign. These forces include the medical, transportation, quartermaster, ordnance, and several other units.

1-3. The above forces are normally employed within a joint theater of operations, and their activities integrated, coordinated, and synchronized with those of joint and multinational forces in support of the joint or multinational force commander.

## ADA MISSION

1-4. The mission of ADA is to protect the force and selected geopolitical assets from aerial attack, missile attack, and surveillance. Aerial threats include fixed-wing and rotary-wing aircraft as well as unmanned aerial vehicles configured to conduct attack missions. Missile threats include unmanned aerial vehicles (UAVs) and theater ballistic missiles (TBMs), cruise missiles, and air to surface missiles. Surveillance threats include UAVs and other air platforms configured to conduct reconnaissance, surveillance, and target acquisition operations.

## ADA ROLE

1-5. The role of ADA is to provide integrated in-depth defensive counterair (DCA) protection of forces and critical assets in the theater, corps, and divisional areas. This protection contributes to the defeat of enemy forces

through destruction of his offensive capabilities. It also contributes to the success of friendly forces by protecting the force and contributing to air supremacy at both the tactical and operational levels.

1-6. All members of the combined arms team perform air defense operations; however, ground-based ADA units execute most of the Army's force-protection mission. These units protect deployed forces and critical assets within a theater by preventing enemy manned aircraft, missiles, and UAVs from locating, striking, and destroying friendly forces and assets.

1-7. Today, the threat to friendly forces is significantly greater than in the past because potential adversaries possess weapons of mass destruction (WMD) and have access to updated technology. The prospect of catastrophic loss of soldiers and the disruption of operational plans and objectives highlights the importance of air and missile defense operations in creating and sustaining combat power within a theater.

## PATRIOT MISSION

1-8. The mission of Patriot is to protect the forces and selected geopolitical assets from arial attack, missile attack, and surveillance. Patriot provides protection against theater ballistic missiles (TBMs), and air threats for critical assets in the corps, and echelons above corps (EAC) areas. Patriot can be tailored to the tactical situation in defending against air, and missile attack.

## PATRIOT ROLES

1-9. Because of the Patriot system's firepower, range, and altitude capabilities, the normal role of the Patriot system is to accomplish the air defense mission within the very low-altitude to very high-altitude boundaries. Patriot is the lower level tier of a two-tier TBM defense system.

1-10. Patriot units are employed to protect forces and critical assets in all types of operations. Patriot units may be deployed individually or as part of an AMD task force to protect entering forces, airfields, seaports, transportation centers, population centers, command, control, communications, computers, and intelligence ($C^4I$) activities and geopolitical assets. The AMD task force may include THAAD, SHORAD, and other joint/multinational units.

1-11. Patriot helps to secure the lodgment in entry operations. As the theater matures and entering forces expand into corps areas, Patriot units support shaping and decisive operations. Some Patriot units move with maneuver forces to provide protection for these forces and critical assets. Other Patriot units remain at EAC and continue to provide air and missile defense of critical assets.

1-12. Some Patriot units may remain in theater as a conflict subsides. These units prevent residual enemy forces or terrorist factions from successfully attacking geopolitical assets or friendly forces that are being redeployed.

1-13. Patriot may deploy during small-scale contingency (SSC) operations to contain localized conflicts, thus obviating the need for a major military response. In these conflicts, Patriot units can be employed to protect forces,

civilian populations, and selected military and civilian assets from air, missile, and surveillance threats.

1-14. Patriot units may also be used to promote stability within a country. In some countries, terrorists or rogue elements may threaten to disrupt normal civil and political activities using air and missile threats. Patriot units may be deployed to protect civilians and geopolitical assets, thereby discouraging threat factions and promoting stability.

## Chapter 2

# Threat

The primary focus of this chapter is the air and missile threat facing Patriot battalions and batteries in theaters. The threat is more diverse now than ever before and may be encountered in virtually every part of the world.

## CONTINGENCY THEATER THREAT

2-1. The threat in the most probable, identified theaters may include theater missiles, unmanned aerial vehicles, and fixed-wing and rotary-wing aircraft. Patriot commanders must be knowledgeable of these threats because of the danger posed to deployed forces and assets. In the paragraphs below, threats are described in terms of their characteristics, capabilities, payloads, as well as future trends. Classified threat characteristics may be found in FM 3-01.13.

### THEATER BALLISTIC MISSILES

2-2. TBMs are surface-launched missiles, normally employed in theaters to attack population centers, airfields, seaports of debarkation, logistical areas, and troop concentrations. The enemy TBMs of primary interest to Patriot commanders are the short-range ballistic missiles (SRBMs), which have ranges up to 1,000 kilometers. These TBMs are usually launched from highly mobile, difficult-to-detect transporter erector launchers and have the capability to carry conventional as well as nuclear, biological, or chemical payloads. Most TBMs are single-stage missiles with relatively modest targeting accuracies (about 1 kilometer circular error probability (CEP) for missiles with a 1000-kilometer range). However, state-of-the-art guidance technologies can improve this accuracy to 50 meters or less.

2-3. TBMs are inherently difficult to defend against. Characteristics that increase TBM effectiveness includes reduced radar cross-sections, high terminal velocities, a variety of difficult-to-kill warheads, and an all-weather salvo launch capability. These characteristics may affect Patriot's detection abilities and engagement timelines, which may result in short notification times for defending forces.

2-4. The major TBM trends are improved accuracy, increased range, and greater payload capacity. TBMs will become more tactically effective. Integration of global positioning systems and terminal guidance features are the current focus of improving accuracy. Tactical utility will increase with improvements in accuracy, range, and payload, allowing them to more effectively target assets that have limited or no mobility. These targets include units in assembly areas, logistical concentrations, command posts, and air defense sites. TBMs can be used to exploit choke points and to create obstacles. Potential adversaries equipped with WMD warheads may also fire them against area targets such as population centers, routes, and likely avenues of approach.

## CRUISE MISSILES

2-5. Cruise missiles (CMs) are unmanned, self-guided aerial vehicles capable of sustaining flight through aerodynamic lift while carrying a warhead or other lethal payload. In a theater environment, they are used to target population centers, airfields and seaports of debarkation, command and control centers, logistical areas, and troop concentrations. CMs are reliable, accurate, survivable, and lethal. They can be launched from a variety of land, sea, and air platforms. They have sophisticated guidance and propulsion systems that allow them to cruise long distances (up to 3000 kilometers) at altitudes as low as 50 meters. They can deliver a variety of payloads with precision accuracy of 10 meters or less when equipped with terminal guidance seekers.

2-6. Defense against CMs is difficult for several reasons. In flight, they are difficult to detect because they have extremely low RCSs and can fly at very low altitudes, often below the radar horizon. They can further evade detection by using natural terrain features such as mountains or valleys to mask their approach, and can attack defended areas from virtually any direction. They carry a wide array of conventional and NBC warheads, to include individually targetable submunitions.

2-7. Threat trends that are being seen, include an increase in land attack CM variants, including missiles with greater range, improved accuracy, reduced radar cross section, and increased lethality. Emerging CMs are incorporating new technologies in airframe and warhead designs, propulsion systems, and improved guidance systems making them accurate and smart. Stealth technologies can be incorporated into cruise missiles, making them an even more challenging target to air defense.

## AIR-TO-SURFACE MISSILES

2-8. ASMs are air-launched, precision-guided missiles designed to strike discrete ground targets such as radars, armored vehicles, bridges and other "point" targets. They are similar to air-launched CMs, but are usually smaller, have shorter ranges, and lack the wings and aerodynamic lift associated with CM flights. ASMs are launched by fighter-bomber aircraft and employ a variety of guidance schemes including radio-command, laser, antiradiation homing, or electro-optical guidance systems. Note: A CM can be classified as an air to surface missile.

2-9. ASMs are an extremely lethal threat because of their versatility and pinpoint accuracy. Defense against ASMs is difficult because of their low RCSs, high velocities, and comparatively long standoff ranges. ASMs that employ antiradiation homing systems are referred to as antiradiation missiles (ARMs); they represent the greatest threat to ADA, field artillery (counterbattery), aviation, and intelligence radars. An enemy aircraft firing an ARM normally attempts to launch from outside the lethal envelope of the air defense system defending the asset.

2-10. ASMs are becoming smarter and more versatile, reliable, accurate, and lethal. New capabilities may include a lock-on-after launch or loitering

capability to attack enemy radars (for ARM variants). Newer missiles may use dual mode seekers for increased reliability and combat capability.

## UNMANNED AERIAL VEHICLES

2-11. UAVs are unmanned aircraft used to perform a variety of missions, ranging from reconnaissance and battlefield surveillance to attack and electronic warfare. Enemy UAVs conducting reconnaissance, surveillance and target acquisition (RSTA) missions are used to detect, identify, and locate friendly targets and conduct battle damage assessments. UAVs equipped with state-of-the-art sensors and data links can provide near real-time targeting for fire support systems, maneuver forces, and aircraft. Those UAVs that are used to conduct electronic warfare (EW) are employed to jam $C^2$ centers and sensor nodes.

2-12. UAV payloads consist of daylight television, infrared video, and film cameras (for reconnaissance missions). Other major payload categories include EW, electronic intelligence, radar, and attack warheads. Several threat nations are developing and fielding antiradiation homing UAVs with the primary mission of attacking battlefield radio frequency emitters (radars, communications). These platforms have a variety of launch options and are usually fire-and-forget systems. Other attack UAV systems employ terminal guidance to kill tanks or fighting vehicles.

2-13. UAVs are difficult to detect, track, or engage because they have relatively low RCSs, and low flight speeds. In addition, their flight profiles take full advantage of terrain, thus masking their presence and increasing survivability. UAVs conducting RSTA missions fly at altitudes safe from small arms fire. In addition, UAVs can stand off and detect from up to 25 kilometers.

2-14. Future UAV roles, in addition to information gathering, will include electronic combat, decoy, ground attack, and suppression of enemy air defense. Standoff ranges may exceed 50 kilometers. A significant new capability involves the direct linkage of a reconnaissance UAV to an artillery unit's fire direction center. This linkage provides near-real-time information to ground commanders, followed by immediate fire and damage assessment. UAVs are also good candidates for stealth technology and spin-off technologies from cruise missile development programs.

## FIXED-WING AIRCRAFT

2-15. Although enemy fixed-wing aircraft no longer present the most challenging threat to air defenders, they remain a formidable threat. They are used to perform a variety of missions in both offensive and defensive counterair operations, as well as–air interdiction, strategic attack, close air support, EW, and RSTA. They can be used to attack friendly troops, convoys, armored vehicles, $C^2$ centers, air defense systems, and other battlefield targets.

2-16. Fixed-wing aircraft are challenging to air defenders for several reasons. First, they can employ a variety of munitions, including guns, rockets, CMs and ASMs. Integrated navigation/bombing computers and related mission

equipment provide the newer combat aircraft with a precision-strike capability day or night and in bad weather. New aircraft also incorporate such features as radar warning receivers, on-board jammers, chaff, flares, and a lower radar cross section to improve survivability and mission success rate. The production of fixed-wing aircraft throughout the world increases the probability that opposing forces may employ the same aircraft in a conflict, thus aggravating the already challenging problem of identification.

2-17. Future technological advances in low-observable materials, aerodynamics, power plants, armaments, and aircraft systems will result in highly capable, but very expensive, aircraft. With the costs of new fighter aircraft increasing, aircraft inventories will probably decline. Increased costs will spur a move toward multirole capabilities (rather than dedicated, single-mission platforms) and increased use of precision, and standoff munitions. Aircraft survivability will continue to improve with the incorporation of advanced electronic warfare suites, advanced countermeasures development, and reductions in radar and infrared signatures. The upgrading of current aircraft (versus replacement with next-generation aircraft) will become the norm.

## ROTARY-WING AIRCRAFT

2-18. Rotary-wing aircraft are used to perform a variety of missions including attack, RSTA, EW, assault, and transport. They can be used to attack troops, armored vehicles, convoys, $C^2$ centers, and other battlefield targets, including air defense systems. Weaponry and payloads include guns, rockets, antitank guided missiles, mines, laser systems, and electronic countermeasure systems.

2-19. Rotary-wing aircraft is difficult for air defense systems to detect, acquire, and engage because they are capable of flying at very low altitudes, using terrain features to mask their presence. Improved fire control and weapon capabilities enable rotary-wing aircraft to search, acquire, and fire at ground targets from longer standoff ranges, thus increasing their survivability and effectiveness.

2-20. Future trends in rotary-wing aircraft include enhanced fire control and aircraft survivability. The most sophisticated technology will be found in dedicated attack helicopters. Six trends stand out—

- Retrofit of existing airframes with modular upgrades.
- Modular equipment (the main focus being electro-optic sensors, weapons, and countermeasure equipment) that facilitates maintenance and reduces cost.
- Expanded night and adverse weather capabilities.
- Improved fire control systems and engagement capability (standoff hovering attacks at greater distances with much improved accuracy).
- Improved infrared countermeasures against infrared-seeking missiles.
- Improved antitank guided missiles with ranges in excess of 10 kilometers.

### LARGE CALIBER ROCKETS

2-21. Large caliber rockets (LCRs) are organic to field artillery units. They are expected to remain the most serious threat to personnel and to all but the most heavily protected vehicles and other equipment.

2-22. LCRs are classified as those of 200 mm and greater. They are unguided, surface-launched, indirect fire rockets with ranges that may exceed 100 kilometers. They can be fired from single or multiple-launch platform. The ability of LCR to deliver high volumes of fire and a variety of warheads makes them ideal weapon systems for fire support missions.

### ELECTRONIC WARFARE

2-23. Electronic warfare (EW) is military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. EW can cause misinterpretation of the information received by electronic systems. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support.

2-24. Adversaries can use EW as an essential component of warfare. EW can be used in conjunction with counterintelligence to protect their command and control while attacking Patriot locations. Electronic warfare, used effectively by the enemy with maneuver and fire support, can locate, identify, damage, and possibly destroy Patriot battalions and batteries.

### WEAPONS OF MASS DESTRUCTION

2-25. Weapons that are capable of a high order of destruction, and can be used in such a manner as to destroy large numbers of people. Weapons of mass destruction (WMD) can be high explosives, nuclear, biological, chemical, and radiological weapons.

2-26. The use of WMD can have an enormous impact on the conduct of all operations. Not only does their sheer killing and destructive power redefine the tactical battlefield, but the strategic, operational, psychological, and political impacts of their use affect campaign designs. The effects of these weapons can cause large-scale shifts in tactical objectives, phases, and courses of action at all levels.

## THREAT DURING LODGMENT

2-27. During entry operations, friendly heavy forces will normally enter a lodgment through seaport and airport areas that are secured from ground attack by light and special operations forces. However, long-range air attacks and missile strikes remain a major concern. During disembarkment into the lodgment, heavy forces are most likely to be attacked by enemy missiles, FW aircraft, and artillery. Once the lodgment has been secured from ground attack, Patriot units may be deployed at any time. When the threat of TBM attack exists, Patriot will likely be deployed early because the defense of the lodgment is critical to the rest of the operation. The lodgment is the base of operations for US forces deployed from CONUS or OCONUS. Assets likely to

be targeted include seaports, airfields, lines of communications, command and control headquarters, logistical resources, ground forces, population centers and commercial activities. Sabotage and terrorist actions also pose a danger, and commanders must ensure their soldiers are aware of this threat as well.

## THREAT DURING OPERATIONS

2-28. As friendly forces begin combat operations or movement beyond the lodgment, the enemy is likely to employ TBMs, CMs, UAVs, RW, and FW aircraft against maneuver units and their support mechanisms. Missiles likely to be used in forward areas include the full range of short-range TBMs–example is the SS-21 missile.

2-29. TBM delivery of persistent chemicals or tactical nuclear weapons could cut off support for forward forces. Theater missiles could be used against Patriot units in rear areas, as well as against $C^4I$ nodes and logistics support facilities. Air and missile defense of the lodgment area remains critical because the threat against it may exist throughout the operation. Lodgment areas ensure the continuous landing of troops and materiels. Because they provide sufficient maneuver space for the buildup of combat powers, air defense must protect its force and all selected geopolitical assets from aerial surveillance during this time.

2-30. The threat facing Patriot units in all theaters is diverse and capable. The air battle in such a theater may encompass the full range of threat TBMs, CMs, UAVs, and aircraft. In some cases, we may face military organizations that are larger than our own. Tactics, weapon systems, training, and capabilities vary from region to region. The threat may possess weapons that are in some ways superior to ours. The key to winning is thorough intelligence preparation of the battlespace.

## Chapter 3

# Patriot Battalion Planning

This chapter describes air and missile defense planning as a top-down, interactive process that involves joint and Army units operating within a theater. It summarizes the planning performed at each echelon, then describes the Patriot battalion planning process and TF planning for the Patriot and TF operations, including the use of automated planning in development of the defense design.

## AMD PLANNING OVERVIEW

3-1. AMD planning involves joint, multinational, and Army units including the joint forces command, service or functional component commands, Army Air and Missile Defense Command (AAMDC), the corps, the ADA brigades, the Patriot battalions, and batteries. At each level of command, planning begins with the receipt of a mission from higher headquarters and culminates in the issuance of an operations plan, which provides planning direction to subordinate commands. The designation "plan" is usually used instead of "order" in preparing for operations well in advance. An operation plan may be put into effect at a prescribed time, or on signal, it then becomes the operation order.

3-2. AMD planning is performed concurrently at all echelons, a process known as "parallel planning." Figure 3-1 shows the planning process performed at each echelon as well as the planning products exchanged between echelons. This planning is summarized in the paragraphs below.

### JOINT FORCE PLANNING

3-3. The joint forces commander (JFC) is responsible for providing the guidance, priorities, tasking, and concept of operations to subordinate commanders. The JFC and his staff develop an OPLAN that describes the mission, situation (including IPB), concept of operations, and tasks that must be accomplished to effectively execute defensive counterair operations. After the OPLAN has been issued, an operational order is then developed. The OPORD is a directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. The OPORD identifies critical assets that must be protected and levels of protection required. These assets are identified in the defended asset list (DAL), a prioritized listing of assets by operational phase. The OPORD also describes command and support relationships and provides coordinating instructions and rules of engagement for both TMs and hostile aircraft.

3-4. DAL development is an interactive process that involves subordinate commands. After reviewing the initial DAL, subordinate commanders and their staffs may nominate additional assets for inclusion in the DAL. The JFC and his staff may incorporate one or more nominees and issue an

updated (re-prioritized) DAL, which then becomes the basis for AMD planning and defense design.

3-5. Other critical planning guidance provided by joint force planners includes the airspace control order (ACO) and the air tasking order (ATO). The ACO implements the airspace control plan, and provides the details of the approved request for airspace control measures. The ATO provides alert states, and the rules of engagement (ROE) for all air defense units. The ATO also provides specific instructions for tasking forces/capabilities/sorties to specific missions and targets. The ATO normally addresses the alert states. The ACO is part of the ATO, although it may be transmitted separately. Both are provided to all subordinate echelons of command. All components of the ACO and the ATO should be included in the planning process to give commanders and staff a complete understanding of the air battle.

## SERVICE/FUNCTIONAL COMPONENT PLANNING

3-6. The service and functional component commander (for example, Army Forces Commander [ARFOR] or Joint Forces Land Component Commander [JFLCC] or the Joint Forces Air Component Commander [JFACC]) reviews the JFC's OPORD, including the mission, situation, concept of operation, tasks, DAL, and other pertinent information. The JFC will normally task the JFACC and AADC to develop the DAL with input from all components. Part of the planning process along with the DAL will contain the levels of engagement effectiveness needed to protect defended assets. See Chapter 5 for a description of each level of defense. The role of the JFACC and AADC is to provide centralized direction, coordination, and integration for counterair operation capabilities.

3-7. The JFC defines the JFACC's authority and responsibilities, which may include, but are not limited to, planning, coordinating, allocating, and tasking for joint civil affairs operations based on the JFC's concept of operations and air apportionment decisions.

3-8. JFACC or AADC staff planners develop and distribute a rough first-order air defense plan (ADP) to the components. The role of the AADC is synchronizing land-based air and missile operations. With input from other components, the staff then produces an operation's plan or OPORD conveying the JFC's strategic and operational objectives but focusing on the service and functional component area of operations. The threat composition must be evaluated in the planning process to determine the objective. The OPORD is then sent to subordinate commands, which include the AAMDC and corps.

## AAMDC PLANNING

3-9. The AAMDC has overall responsibility for planning Army AMD operations in support of the ARFOR commander or JFLCC. Planners review the assigned mission, critical assets to be protected, the enemy situation, and the composition and disposition of AMD resources available to protect critical assets against the known threat. This is based on the IPB process. They then perform a top-level defense laydown to estimate if available AMD resources can adequately protect critical assets. If required, levels of protection cannot

be achieved; additional resources are requested from the service or functional component commander (or the commander is advised of the risk to forces or assets). See Figure 3-1 for responsibilities of each echelon.

3-10. Based on this planning, the AAMDC task organizes the subordinate EAC brigade(s) and assigns missions to the brigade(s). If the AAMDC is not present in theater, the responsibility for this planning falls to an EAC ADA brigade. To ensure the overall Army AMD effort within the theater is coordinated and synchronized, the AAMDC must coordinate planning with the corps and corps ADA brigades.

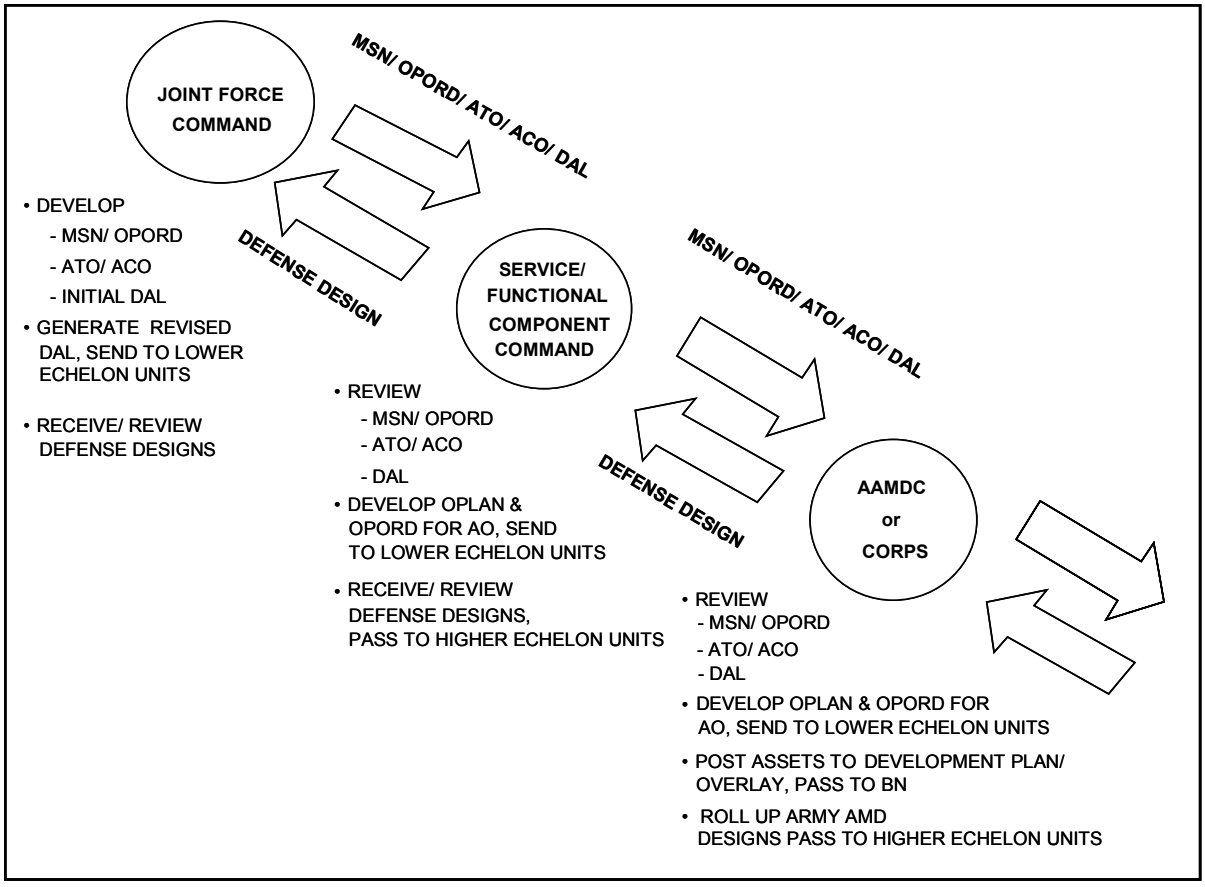



**Figure 3-1. AMD Planning Process**

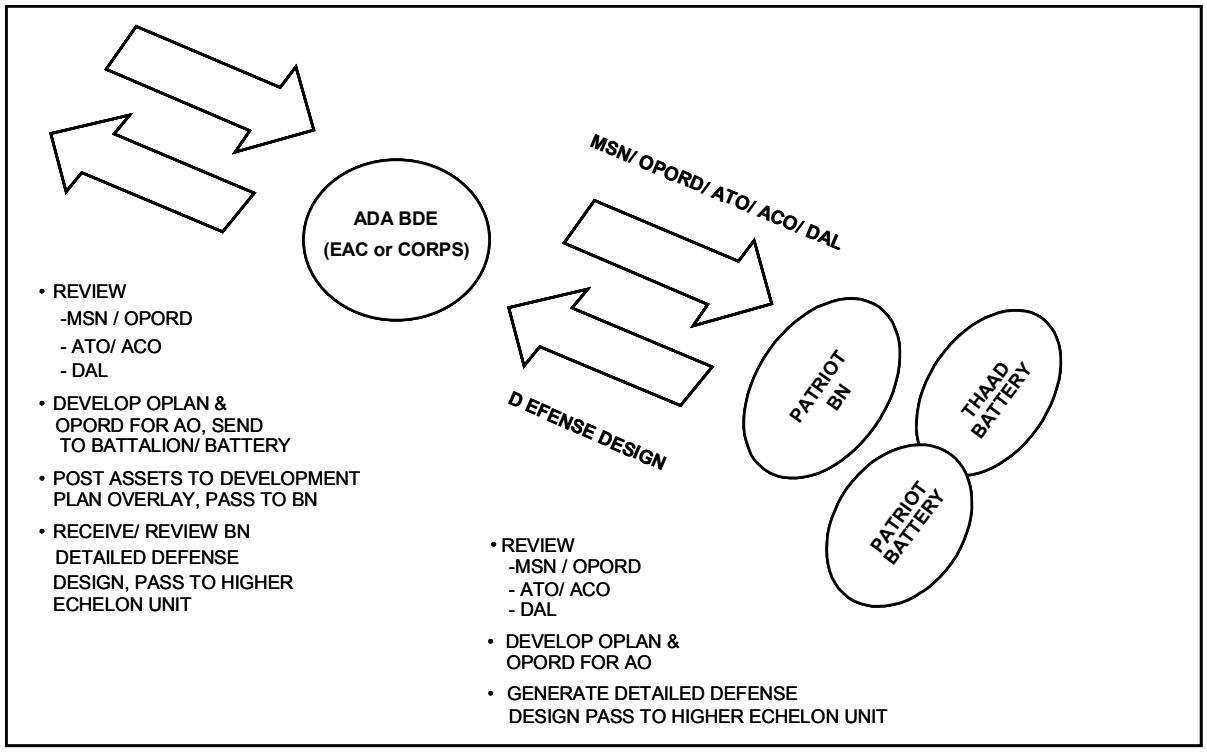



**Figure 3-1. AMD Planning Process (Continued)**

## CORPS PLANNING

3-11. Corps planners perform essentially the same planning functions and produce the same planning products as the AAMDC planners, except the focus is on protecting maneuver forces and critical assets within the corps AO. Because the corps lacks robust automated AMD planning capabilities, it relies upon the subordinate ADA brigade to perform most of the AMD planning, including development of the AMD annex to the corps operations plan. In developing the AMD annex, the brigade uses its organic planning capabilities and may leverage those of subordinate Patriot battalions as well.

3-12. Based on this planning, the corps task organizes the subordinate ADA brigade and assigns the mission to the brigade. It also coordinates with the AAMDC to ensure the corps effort is integrated and synchronized with the theater Army's AMD effort.

## ADA BRIGADE PLANNING

3-13. The brigade commander and his staff review the OPORD received from higher headquarters, including the mission, situation, concept of operation, tasks, AD priorities and other information. He and his staff then produce an operations plan that describes how tactical operations in the brigade AO will be carried out. This plan includes the restated mission, tasks to be performed, resources to be allocated, assets to be protected, number of FUs needed to protect assets, and coordination and control measures to be followed.

3-14. The number of fire units needed to defend an asset can be determined by using the DAL and the levels of engagement effectiveness prescribed by the JFC. Critical assets are posted to a database/overlay, and provided to subordinate battalions along with the OPORD.

## PATRIOT BATTALION PLANNING

3-15. The focus of battalion planning is to produce a detailed defense design that protects forces and critical assets with required levels of protection. The battalion planning process is depicted in Figure 3-2. The diagram shows how the TCS is part of the MDMP. The defense design is accomplished using automated planning capabilities resident in the TCS. The TCS provides the battalion commander and staff with organized workspace to support defense planning with automated decision aids, real-time situation awareness, and initialization of the battalions' weapon systems.

3-16. For each step, battalion planners require specific information inputs to accomplish the planning function(s). These inputs are listed on the left side of the figure. As each step is completed, specific planning products are produced. These products, or outputs, are listed on the right side of the figure. The steps must be performed in sequence to produce an accomplished mission with a defense design plan that adequately protects forces and assets. A description of the planning process highlighting principal planning functions for each step is provided in the paragraphs to follow.

### RECEIPT OF MISSION (STEP 1)

3-17. After the mission is received over the TCS from brigade, the battalion commander directs his staff to begin gathering mission essential tasks, facts, estimates, situation templates, weapon's status, availability of support, and possible obstacles needed to discuss the mission in depth. The battalion commander makes rapid assessment and gives the staff a restated mission and sufficient guidance needed to begin the planning process. Based on the commander's guidance, the staff develops a warning order designed to notify subordinate units of the impending mission. After information is gathered, the staff conducts an initial METT-TC analysis using the TCS. This analysis determines–

- The mission (task and purpose).
- The enemy (unit, size, and type).
- The area of operations (required movement, and starting time).
- The attachments and detachments (who, and when).
- The time available (time for further planning and when to issue the warning order, FRAGO, or OPORD).

#### Warning Order #1

3-18. The warning order (WARNO) identifies the type of AMD operation, its general location, the associated time lines, and any movement, deployment, or reconnaissance that must be initiated. Upon the commander's approval,

the WARNO is sent to subordinate units and mission analysis begins with an initial restated mission.

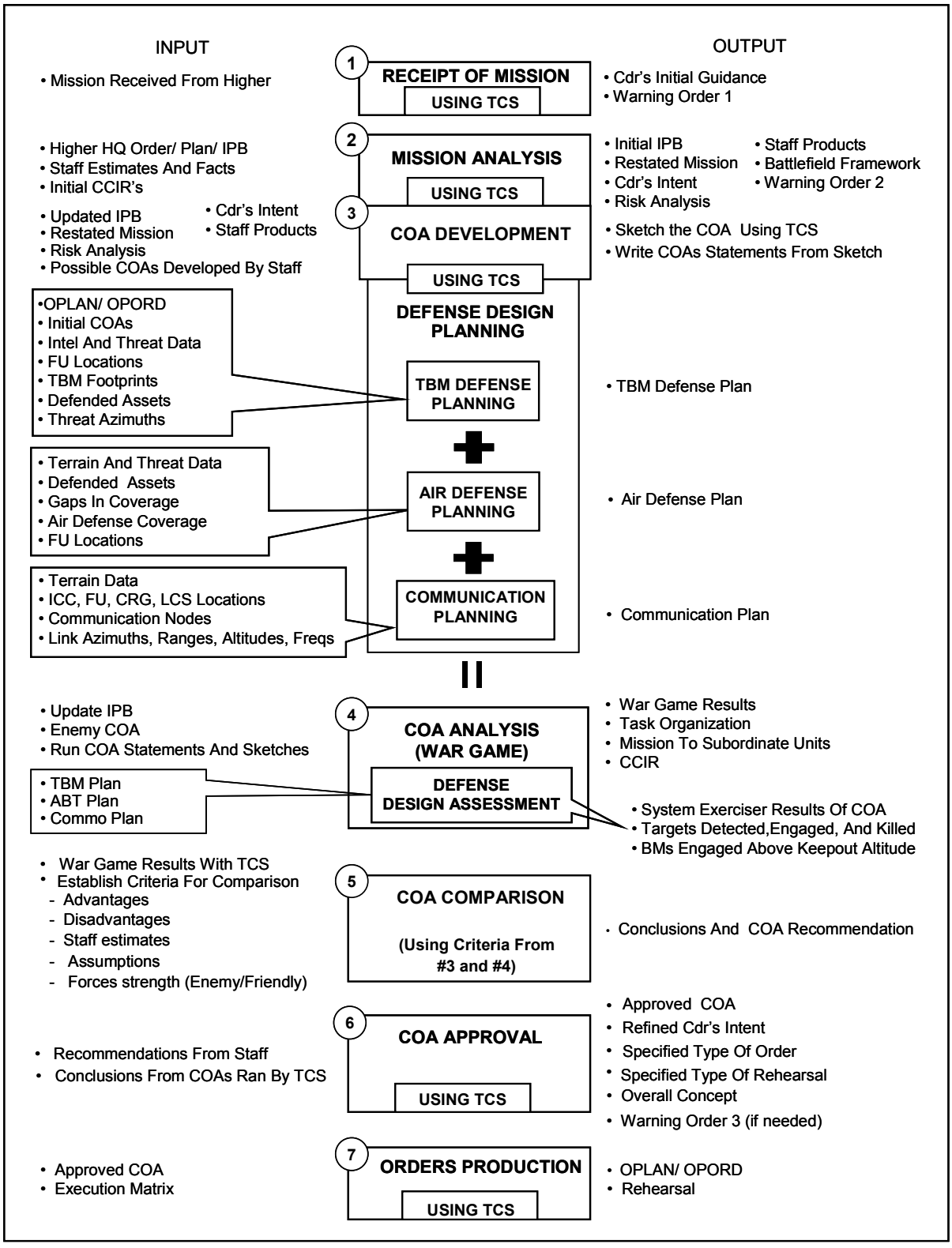



**Figure 3-2. Patriot Battalion Planning Process**

## MISSION ANALYSIS (STEP 2)

3-19. The battalion commander and staff, read and analyze the OPORD so that they completely understand the brigade commander's intent. The staff uses the TCS to conduct an intelligence preparation of the battlefield to determine and evaluate friendly and enemy capabilities, vulnerabilities, and possible course of actions. A detailed description of the Patriot IPB process is provided in Appendix D.

### Tasks

3-20. The staff also determines the specified, implied, and essential tasks required to accomplish the mission. Specified tasks are delineated in the OPORD. Implied tasks are tasks that must be performed in order to accomplish the specified tasks, but are not stated in the brigade or higher headquarter's order. Essential tasks are those tasks that must be executed in order to accomplish the mission. The essential tasks are derived from the list of specified and implied tasks.

### Commander's Initial Assessment

3-21. The commander's initial assessment of tactical risk not only has importance in COA development, but also can affect the constraints and the accidental risk to soldiers and equipment. Such areas as movement procedures, timelines, air defense primary target lines, and missile distribution will ultimately be addressed when comparing tactical risk between COAs. An initial assessment of these areas at this point will provide the staff with insight during COA development and comparison.

3-22. Acting upon initial guidance, the staff carefully reviews available AMD assets. The staff can use the TCS to review the current number and type of fire units, the battalion's maintenance posture, the personnel/critical MOS shortages, and any supply issues that may require additional resources for mission success. Although largely derived from staff estimates and current unit reporting, the commander and staff analyze the assets and the list of tasks to ensure the battalion can conduct all specified and implied tasks. Any limitations are immediately brought to the commander's attention.

3-23. The staff next determines constraints on the commander's freedom to maneuver, and identifies critical facts and assumptions pertinent to the overall operation. The commander and staff should be aware of any assumptions that the ADA brigade has made in developing the order that the battalion has received. The staff also conducts a risk assessment.

### Critical Information Requirements

3-24. The staff determines the commander's critical information requirements. Initial CCIRs during mission analysis are those things that help support the commander's initial decision on which course of action to choose. Additional information requirements (IRs) support the commander's battlefield visualization and set a baseline for reporting from subordinate units. These include priority intelligence requirements (PIRs), friendly force information requirements (FFIRs), and essential elements of friendly

information (EEFI). The PIRs include critical information that must be known about the enemy. The FFIRs include critical information that must be known about friendly forces. The EEFIs include critical information about friendly forces that must be withheld from the enemy. These CCIRs will have to be refined once a COA is decided on to support the decision points identified in the COA. The number of CCIRs should not be extraordinarily high. Selected CCIRs should be carefully chosen so that every leader in the battalion will know and act upon them expeditiously.

3-25. The staff also develops the initial reconnaissance annex. Unlike maneuver units, Patriot battalions do not maintain organic reconnaissance units. Instead, the S2 must rely on higher intelligence sections such as AAMDC G2 and corps reconnaissance assets that are searching for enemy air and missile threats. However, the S2 must still develop named areas of interest (NAIs) and compare information with higher intelligence—especially if those NAIs are designated by higher intelligence and impact upon the battalion's operation.

### Battalion Timeline

3-26. During mission analysis, the commander and staff update the battalion timeline, reexamining all aspects of time in terms of what is required to accomplish the essential tasks. The most critical aspect of the timeline is getting orders to subordinate units to give them the maximum time for execution. The staff compares the battalion's timeline with that of the ADA brigade, and considers parallel planning and its impact upon the battalion staff, and subordinate units. The battalion XO and the S3 works together to ensure the battalion timeline do not disrupt the flow of current operations. More importantly, the battalion S3 and S2 compare the battalion timeline with possible enemy timelines (from the developing situational template narratives). This is required to ensure that the intelligence and operational timelines match the same definition of H-hour. Finally, the battalion S3 staff writes down critical battle times and critical events (to include staff times, briefs, rehearsals, etcetera), and disseminates this information (preferably in warning order #2), transferred digitally down to the battery level to the BCP.

3-27. The battalion S3 then reviews the essential tasks and prepares the restated mission. The revised mission statement indicates the purpose of the mission and identifies the force structure that will be used to conduct the mission (example, a task force or battalion minus, etcetera). It also specifies the type of action to be undertaken (example, TBM, aircraft, or mixed defense); the area of operations, and the time the operation is expected to begin.

### Mission Analysis Briefing

3-28. The staff then conducts a mission analysis briefing to the commander that summarizes the results of the mission analysis. This briefing includes a review of the higher echelon unit's mission statements and the battalion commander's initial guidance. It summarizes the initial IPB products, specified, implied, and essential tasks, operational constraints, forces available, hazards and risks, recommended initial CCIRs, recommended

timelines, CVRT matrix, and the recommended restated mission. The TCS is used to deliver this information to the commander.

3-29. Upon conclusion of the briefing, the commander may approve the restated mission. He can modify or choose a mission statement that he has developed. Once approved, the restated mission is the battalion's mission.

**Commander's Intent**

3-30. The commander then prepares his intent statement, which states the key tasks the battalion must accomplish in order to successfully complete the mission. Examples of key tasks are: the operation's tempo, duration, effect on the enemy, and the degree to which assets will be defended.

3-31. The commander issues guidance that focuses on the essential tasks supporting the mission. The staff in turn, uses this guidance in developing possible COAs. The commander may also begin to identify decisive points and the amount of combat power whether in terms of FUs, control, or missile usage against the enemy air threat at specified times. The commander's guidance usually addresses—

- Specific COAs, both friendly and enemy (for example, most likely and most dangerous).
- CCIRs.
- Reconnaissance/RSOP.
- Risk guidance.
- Deception guidance.
- Battlefield specific guidance.
- Force protection guidance.
- Priorities for maintenance and support operations.
- Time plan changes.
- Orders guidance.
- Rehearsal guidance.

**Warning Order #2**

3-32. The staff then issues the second warning order, which contains—

- Restated mission.
- Commander's intent.
- AO (sketch, overlay, and other description).
- CCIRs.
- S2 templates,narratives, and other IPB products as necessary.
- Risk guidance.
- Reconnaissance/RSOP guidance.
- Force protection guidance.
- Deception guidance.
- Specific priorities.
- Timelines (to include battle and events).
- Rehearsal guidance.

## COURSE OF ACTION DEVELOPMENT (STEP 3)

3-33. Upon completion of the mission analysis, the staff begins developing COAs. Courses of action are developed using the TCS located in the battalion TOC. COAs include support requirements, type of support used, and designation of the main attack, supporting attack and reserve forces. The TCS has the capability to plan and analyze defense design for, TBM defense, aircraft defense, and communication. After these COAs are made, they provide essential elements for the overall analysis of the defense design. Acceptable COAs not only provide coverage for all assets, but they also are flexible enough to allow the battalion and batteries to execute quick responses and adjust coverages in the event of equipment outages or enemy activities. COA development involves analyzing relative combat power, generating options, arraying initial forces, developing the scheme of maneuver, assigning headquarters, and preparing COA statements and sketches. When developing COAs the following criteria should be examined:

- Suitability.
- Feasibility.
- Acceptability.
- Distinguishability.
- Completeness.

3-34. Patriot battalions must first correlate their forces against enemy capabilities. Information about the enemy is input into the tactical planner workstation (TPW). This is used to develop the defense design plan. Note: There are two consoles within the TCS, the tactical planner workstation and the air and missile defense workstation (AMDWS).

### COA Options

3-35. Because there is usually insufficient time to examine every possible enemy COA, the commander normally limits COA development to the most likely COA that the S2 has templated. The commander's guidance may require the staff to develop options based upon certain aspects of the S2's most effective COA, and incorporate those options into one or all friendly COAs.

3-36. In order to develop the COA sketch, the staff must visually determine the decisive point in the AMD operation. For Patriot battalions, the decisive point is when and where the battalion will provide air defense coverage to designated assets in relation to enemy air and missile attacks. The decisive point is also related to the commander's endstate, or desired outcome of his intent.

3-37. To determine the distribution of FUs and lay the foundation of the air defense scheme at the decisive point, the battalion staff reviews the restated mission, the higher commander's intent and guidance; the AAAs and TBM launch locations, and the enemy COAs (sit temps/narratives, including the most dangerous COAs if time permits).

3-38. The staff then considers the type of missions for FUs, and in the case of force projection, the minimum number of engagement packages needed. The staff uses CVRT and the TCS to determine exactly what assets are affected

and when and how much combat power each must have for protection. This initial array identifies the total number of FUs needed, as well as possible critical resource requirements such as missile types, numbers, and distribution. If the number of FUs arranged at the decisive point is greater than the number available or able to arrive in theater, the shortfall is identified as a possible requirement for additional resources such as MEPs or Patriot missile types. See Appendix F for a description of the basic MEP.

### Scheme of Maneuver

3-39. The staff then develops the scheme of maneuver, which describes how arrayed FUs will accomplish the commander's intent. The scheme of maneuver is the central expression of the commander's concept for operations and governs the design of supporting plans or annexes. For the Patriot battalion, it is the concept for the defense design, and will become the COA statement. The scheme of maneuver addresses—

- Purpose of the operation.
- Where the commander will accept tactical risk.
- Identification of critical events and phases of the operation.
- Task and purpose (priority of engagement [PE] and priority of protection [PP]).
- Maintenance and support operations.
- Movement reconnaissance.
- Force protection operations.
- Command and control.

### Layout of Fire Units

3-40. The staff next assigns the headquarters' element to the groupings of FUs. Although this sounds relatively simple, the battalion may deploy over wide distances, where two groupings of C2 are required. In addition, a grouping of FUs may have to conduct fire unit to fire unit operations under a master battery. FUs may act autonomously or independently during the decisive point. The Patriot battalion may even act as a task force, incorporating such units as THAAD, Avenger/Stinger, and force protection slices from infantry, military police, or host nation security elements.

### Sketches and Statements

3-41. The staff now completes a sketch and statement for each COA under the supervision of the battalion S3. Each COA sketch/statement should clearly portray how the battalion will accomplish the mission and explain the air defense scheme of maneuver. The TCS helps develop the COA sketch. The sketch should include—

- Maneuver unit boundaries (exactly who "owns" the land Patriot forces will be moving and operating from).
- Forward edge of the battle area (FEBA), LD/LC, and any phase lines.
- TBM brigades, battalions, or launch locations.
- AAAs, to include air bases if available.

- Known or suspected enemy SOF/terrorist locations.
- Maneuver graphics that might affect the conduct of Patriot operations (such as assembly areas, battle positions, strong points, engagement areas, and objectives).
- FUs, MEPs, maintenance, and C2 units.
- TBM range fans to include secondary target line (STL) coverage and tailored search.
- CSS graphics to include MSRs, movement control measures, etcetera.
- Assets to be defended.
- Significant terrain or identifying features.

## DEFENSE DESIGN PLANNING

3-42. Defense design is accomplished using automated capabilities resident in the TCS. Defense design planning is done with the COA development. It involves planning TBM and aircraft defense, and then analyzing these initial defense designs to determine if they provide adequate levels of protection against expected threat scenarios. Communications planning is also performed as part of the defense design process.

3-43. In developing a defense design, planners use information from the initial IPB, risk analysis, battlefield framework, sketches, COA statements, intelligence, and any other sources as needed. The Patriot battalion via the AMDWS and other interfaces in the TCS receives the OPORD and intelligence information. This information includes—

- Assets to be defended.
- Expected enemies TBM launch points.
- Friendly order of battle.
- Enemy OB.
- ACOs.
- Geographic AO.
- Digital terrain and elevation data.

3-44. Planners load digital terrain and elevation data for the AO into the tactical planner workstation, then create friendly and threat overlays based on information from the OPORD and other sources. These overlays show the location of protected assets, friendly units, threat forces, and expected TBM launch points. They also show airspace control boundaries and volumes derived from the ACO.

## TBM DEFENSE PLANNING

3-45. In planning TBM defenses, planners first display the terrain and overlays for the AO, then with the aid of the software, determine the optimum FU locations, taking into consideration the assets to be defended, expected threat launch points, and geographical constraints. They place the FUs and launching station symbols at the software-recommended locations, then choose appropriate TBM footprints (from the TCS database) based on the expected threat. The displayed footprints are based on TBM type, TBM range, Patriot missile type, minimum probability of kill (Pk) necessary to

achieve a required defended area footprint, and the keep-out altitude. If the Patriot units have extended remote launch capability (that is, PDB-5 software with configuration 3 (CE3) and PAC-3 missiles), planners may place an enhanced CRG or ECS to operate as a launcher control station (LCS) for RL-3 launchers at selected locations to improve coverage of defended assets.

3-46. Using automated capabilities, planners next tailor the radar search based on the geometric relationship between defended assets and the projected threat launch points. If Patriot is operating as part of an AMD task force, planners also designate the lower tier defended assets.

3-47. The completed initial TBM defense design shows the location of defended assets, the location of Patriot FUs, RL-3 communication links, the threat azimuth(s), and the TBM footprints.

## AIR DEFENSE PLANNING

3-48. Defense planning can be conducted in parallel with TBM defense planning or as a separate activity. As in TBM defense planning, a variety of data must be loaded into the TPW, including the defended assets, threat information, and terrain data. Using the color-coded elevation display, planners can view the geographic AO as color contours, with colors keyed to elevation. This allows planners to visualize ridges and valleys, which define the most likely air avenues of approach.

3-49. Using the tactical planner workstation (TPW), planners determine the optimum FU locations based on geographical constraints, assets to be defended, and threat AAAs. They place FU and LS symbols at selected locations and determine radar sector coverage. This is accomplished by the software, which computes and displays radar coverage for each FU. The result is a four-color map showing radar coverage for four operator selected elevations. When viewed in combination with the color-coded elevation, a comprehensive display of air defense coverage and gaps in coverage are shown. The use of ABT includes FW, RW, UAVs, and cruise missiles. The Patriot system and the TCS classify these threats as ABTs when dealing with software.

3-50. When the air defense design is completed, it shows the location of the defended assets, the location of Patriot FUs, the threat AAAs, and the radar coverages and gaps.

## COMMUNICATIONS PLANNING

3-51. Communications planning begins with the FU locations selected in the defense design overlay. The TPW software creates and displays communications links between each unit, ICC, CRG, and LCS. Planners can analyze each link to assess its condition. The links are color-coded as follows: If a link is red or yellow, planners can relocate the CRG symbol or adjust the antenna's height and/or frequency until the communications are green.

- Red = no communications.
- Yellow = line-of-sight only, possibly degraded communications.
- Green = good communications.

3-52. This communications analysis encompasses not only Patriot battalion and battery communications, but also communications links between the ICC and higher echelon units (HEU), task force units and the Air Force control and reporting center (CRC), and adjacent units.

3-53. After completing the above analysis, planners can automatically create a pictorial representation of the communication's plan ("bubble chart") showing the locations and elevations of the communications nodes, the azimuths of the links, the ranges between nodes, and the communication frequencies. A detailed discussion of communications planning is presented in Appendix C, *Communications*. Once defense design is complete, the COAs are compared and a tactical risk is added to each statement.

### Air Defense Scheme

3-54. The COA statement (air defense scheme) should include—

- Restated mission. This includes who, what, when, where, why and how, based on the mission analysis.
- Each FU's task and purpose (PE, PP, PTL/STL, air breathing threat, TF, TBM threat, and defended assets)
- Endstate. Commander's hope, what he wants to accomplish in the end.
- Tactical risk. Within the course of the mission, the possible risks that could occur to the soldiers or the equipment should be considered.

3-55. After the COAs have been developed, and the defense design plan has been established the COAs are briefed to the commander for review. If the commander is unavailable, the battalion XO or S3 should review the work of the staff. The COA briefing should include—

- Updated IPB products (to include event templates/matrices) using the TCS.
- Restated mission, commander's intent (battalion, 1 & 2 levels up).
- COA sketches and statements (to include rationale).
- Updated facts and assumptions.

3-56. After the briefings, the commander may give additional guidance. This guidance is used to fine-tune the COA. If he rejects all COAs, the staff must begin again. If he accepts one or more of the COAs, the staff begins the war-gaming process.

## COURSE OF ACTION ANALYSIS (WAR GAME) (STEP 4)

3-57. The staff analyzes the COAs that have been developed. To conduct this analysis, the staff uses the TCS and takes into consideration friendly forces available, known critical events, decision points, and other factors. The staff develops the evaluation criteria that are used to compare COAs. Examples of AMD criteria include early warning, passive air defense, command and control, force protection, active air defense, communications, and sustainability.

3-58. The TCS is used to analyze and war-game all possible COAs. The estimate of the situation is an integral part of the decision making process. It

incorporates analysis factors of METT-TC and defense design COAs developed by the TCS into a process that allows the commander to select the best course of action as the basis for the plan. One way to evaluate courses of action is to war-game them against likely enemy courses of action. Beginning with the most probable COA, IPB plays an important part in COA analysis. The IPB develops a clear picture of the battlefield that includes the enemies' actions and possible movement plans.

3-59. The staff then selects the war-gaming method to be used. There are three war-gaming techniques that are described in detail in FM 101-5, the belt, avenue-in-depth, and the box technique. Because of the nature of air defense operations, battalion staffs should consider using the belt or avenue-in-depth war-gaming techniques.

### Belt Technique

3-60. When using the belt technique, Patriot battalion staffs analyze the battlefield by dividing it into belts. This is most effective when the staff phases the battlefield and considers the movement of the enemy air and TBM forces, as well as the movement of Patriot units, across time and space. This technique is most effective when significant movement of forces is required.

### Avenue in depth

3-61. When using the avenue-in-depth, Patriot battalion staffs analyze the battlefield by focusing on one AAA or TBM NAI at a time. The advantage of this technique is the in-depth analysis of the enemy air and missile force in relation to each defended asset.

3-62. The staff then records and displays the results of war-gaming. The recording of the war game is critical not only for the comparison of the COAs, but also the development of the required information necessary for the decision support template (DST) as well as the subsequent battalion order. There are two methods of recording—the synchronization matrix, and the sketch note method, which are discussed in Appendix D.

### Actions Cycle

3-63. During war-gaming, the staff uses an action-reaction-counteraction cycle with applications specific to Patriot operations. Actions are those events initiated by the side with the initiative (for example, the enemy air and missile forces execute actions along AAAs and TBM launch points). Reactions are the ways in which the opposing side might respond (for example, FU engagements or coverage adjustments such as slewing to an STL, etcetera.). Counteractions are simply the response to that reaction (for example, the enemy air force may reposition ARM carriers to another airbase/AAA).

3-64. The commander and staff may modify the COA based upon the outcome of the war game, as well as current updates on the situation. In addition, war-gaming allows the development of branches and sequels from the COA. Essentially, war-gaming refines the COAs into viable and usable proposals for an air defense plan.

3-65. If time permits, the battalion XO will review the results of the war-gaming prior to moving on to defense design assessment, and COA comparison. The war game brief will consist of—

- Higher headquarters mission/intent, and deception plan (if any).
- Updated IPB.
- Enemy COAs and friendly COAs war-gamed.
- Assumptions.
- War game technique/recording method used.

## DEFENSE DESIGN ASSESSMENT

3-66. After the initial defense designs are completed, planners can use the TCS to analyze the COAs and display the results in terms of targets detected, engaged, and killed. To accomplish this, planners need to:

- Input the defense design based on the anticipated mission threat COA. Inputs include threat origin, velocity, altitude, TM/ARM/CM type, aircraft type, intended target, and approximate arrival time of the enemy.
- Run the TPW so that it executes the defense design and displays the threat targets in ICC symbology. The system generates and displays detection, missile fly-out, and engagement information. Results are then saved to the hard drive.
- Display the results on the monitor (or hard copy printout). The results are expressed in terms of targets detected, targets engaged, and targets killed (by FU and battalion totals). Also shown are TBMs engaged above the established keep-out altitude.

3-67. Planners can use the TCS to assess TBM and air defense designs against a variety of threat COAs, or assess a variety of TBM or air defense designs against a given threat COA. After all defense designs are completed, a fragmentation order may need to be issued to cover new information that has been gathered.

## COURSE OF ACTION COMPARISON (STEP 5)

3-68. The staff compares the results of war-gaming using criteria from step 3 and step 4 against established criteria to determine the preferred COA. The TCS is used for analysis of the advantages and disadvantages for each COA. This comparison is often made with the aid of a decision matrix, which uses evaluation criteria to assess the effectiveness and efficiency of each COA. The staff identifies the preferred COA and recommends that COA to the commander. If the staff cannot decide, then the battalion XO chooses the COA to recommend at the briefing. The commander's decision briefing includes—

- Intent of higher headquarters (1 and 2 levels up).
- Restated mission and status of own forces.
- Updated IPB.
- Each COA and war game result (to include assumptions, results, advantages, disadvantages, and the decision matrix) ran by the TCS.

- Recommended COA.

**COURSE OF ACTION APPROVAL (STEP 6)**

3-69. Based on the TCS data, staff recommendations, and his own knowledge and experience, the commander decides on a COA. Once the commander approves the recommended COA, the staff immediately begins processing the 3rd warning order. This warning order may be verbal or digitally transferred to the batteries depending on the situation and amount of time. The warning order includes the information necessary to refine the FUs plans as METT-TC dependent. It is important to note that all Patriot batteries must develop and process their own operations orders (parallel planning). As much information should be given so that the batteries identify their missions and refine their troop leading procedures as needed for additional planning. If the battalion commander rejects all developed COAs, the staff will have to start the process all over again. The staff immediately completes the plan and operations order. The COA statement, if approved by the commander, becomes the concept of the operation and foundation for the air and missile defense design.

**ORDERS PRODUCTION (STEP 7)**

3-70. Using the latest reconnaissance and intelligence information, the staff finalizes the concept of operation, adds details, and prepares orders using the AMDWS. It refines and incorporates it into OPLAN/OPORD, the final task organization and plans for fire control, CSS, security, surveillance, communication, command and control measures, and lateral or flank coordination. The staff determines requirements for additional support and requests it from higher headquarters. It also coordinates with adjacent, supporting, and higher headquarters. The staff also develops contingency plans. After the OPLAN/OPORD has been put together, the commander may decide to make final adjustments. When the commanders' intent has been reached, final orders are approved.

3-71. The battalion commander issues the OPLAN/OPORD to all subordinate commanders and sections. The TCS is the preferred method to disseminate all necessary information to the BCP and subordinate units. As battery commanders develop their plans, minor changes may be needed to implement the commanders' intent. Any change to the plan must be coordinated with the battalion commander. The battery commander should use any aids, such as a sketch or a sand table, to help his soldiers visualize the terrain. He can require subordinates to backbrief him on their unit's role to ensure they understand their instructions and his intent. This can be done after the orders briefing.

3-72. After the orders have been issued, the TCS downloads all the tactical information data down to the BCP. This information may include routes, engagement zones, defended assets, avenues of approach, and corridors along with other needed information at the battery level.

3-73. The commander and his staff supervise and refine the plan based on the ability to accomplish the overall mission. Such preparations include coordination, reorganization, fire support, engineer activities, maintenance,

resupply, movement, missile reload, and rehearsals. Rehearsals are conducted to reinforce both the scheme of maneuver and defense design. 3.74 3.74. When possible, conduct rehearsals under limited visibility or simulated NBC conditions and over similar terrain. Considerations should also be considered for engagement operations at the ICC and FU level. Key staff and subordinate commanders should take part in rehearsals. They can identify problem areas and contingency actions, determine movement and reaction times, help coordination, and refine the plan.

3.75. Rehearsals and backbriefs should identify key events and critical tasks, which subordinates must address to the commander's satisfaction. Whenever a significant change in the factors of METT-TC occurs the OIC must ensure that the battalion commander, staff, and subordinate unit commanders know it. Before the start time of the operation, the S2/S3 should update any changes to the known enemy situation. Refinement of the plan is a continual process using the TCS to analyze effectiveness. Throughout the fight, the commander monitors the progress of the battle. He does not hesitate to adjust or modify his original plan when METT-TC requires a significant change in the development factors of the battle.

## Chapter 4

# Force-Projection Operations

This chapter summarizes the force-projection process and describes Patriot activities during force-projection operations. Patriot may be deployed to support operations anywhere in the world to protect forces and selected geopolitical assets.

## FORCE PROJECTION PROCESS

4-1. The force-projection process, depicted in Figure 4-1, involves mobilization. These elements are summarized below—

- Mobilization involves assembling and organizing personnel, supplies, and materiel to prepare for war or national emergencies. It is the process through which reserve component units are brought to a state of readiness, activated, and prepared for deployment.
- Deployment involves moving military forces and materiel from their point of origin into a theater of operations. These forces and equipment typically leave the port of origin via air or seaports of embarkation (APOEs or SPOEs) and arrive in theater at air-or seaports of debarkation (APODs or SPODs). From there, they proceed to marshaling areas, where they are prepared and configured for later movement into staging and to tactical assembly areas (TAAs).
- Employment involves conducting military operations to support the objectives of the joint-force commander. Employment encompasses a variety of operations including entry operations (opposed or unopposed), shaping operations (lethal and non-lethal), decisive operations, and post-conflict operations.
- Redeployment involves re-posturing units and materiel to prepare for demobilization or force reconstitution. Units that do not participate in post-conflict operations are sent to one or more staging areas within a redeployment assembly area, then via air or sea to APODs or SPODs to new mobilization stations or theaters.
- Sustainment involves providing and maintaining levels of personnel and materiel needed to sustain an operation throughout its duration.

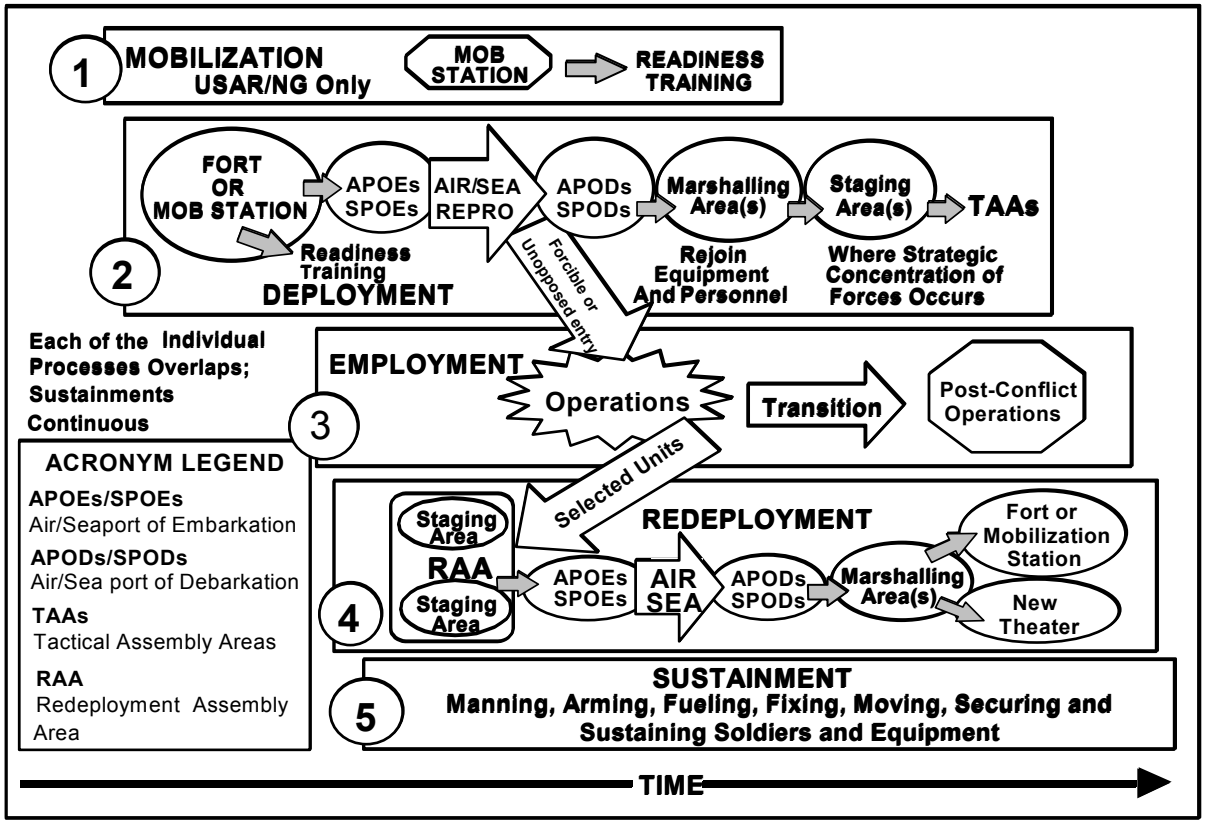



**Figure 4-1. Force-Projection Process**

## MOBILIZATION

4-2. The mobilization process applies to reserve component (RC) units; some phases also apply to active components. Figure 4-2 shows a diagram of these phases. This process is divided into five phases—

- Planning and preparation.
- Alert.
- Home station.
- Mobilization station.
- Port of embarkation.

4-3. The **planning and preparation** phase includes the normal day-to-day efforts of RC units at their home stations. During this phase, Patriot battalion's plan, train, and prepare to accomplish assigned mobilization missions. This includes preparing mobilization plans, conducting mobilization training, and developing post-mobilization training plans. Units must provide unit personnel, logistics, and training data electronically to their respective power projection platforms and power support platforms and must develop plans for movement to the mobilization station (MS). This phase ends when units receive official alert notification.

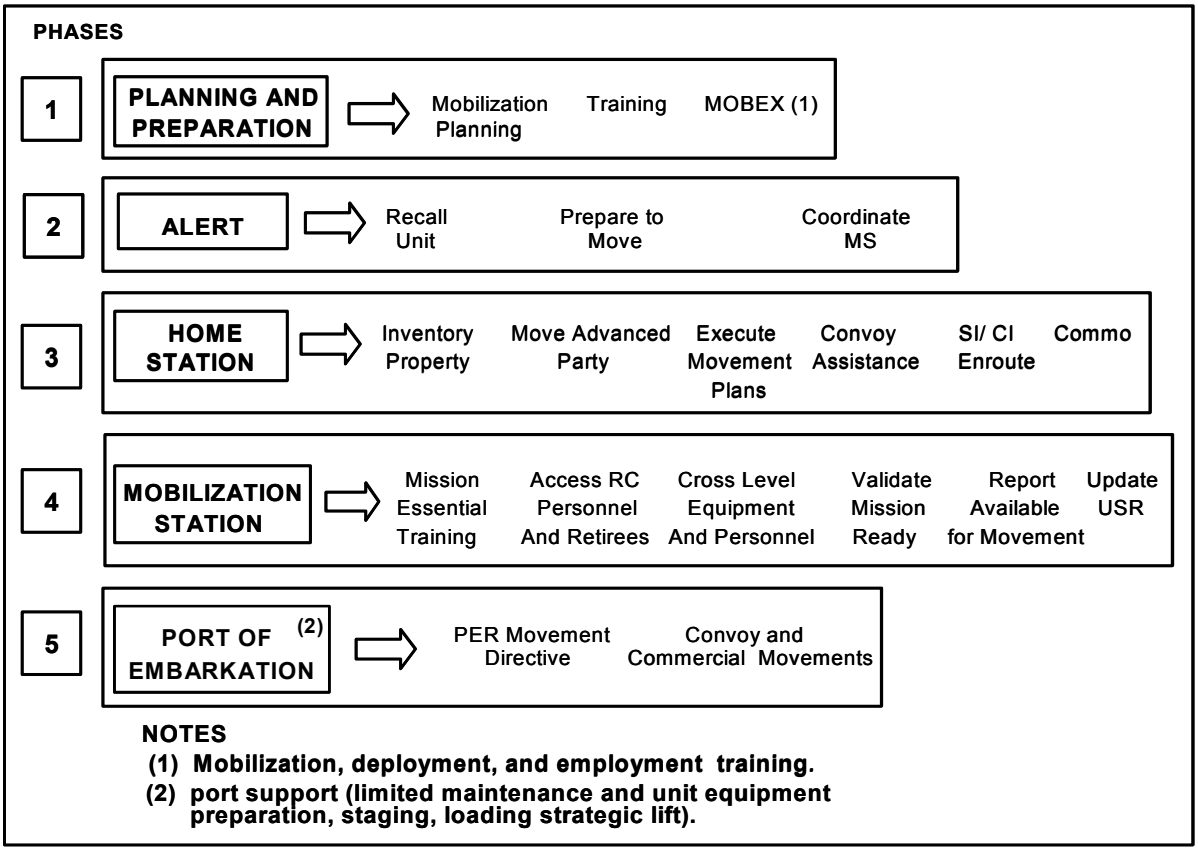



**Figure 4-2. Mobilization Phase**

4-4. The **alert** phase includes those actions taken by units following receipt of an alert. Units take specific actions to prepare for transition from RC to active status including screening and cross leveling of personnel. Patriot unit commanders must contact the receiving unit commander to determine mission requirements in order to modify the units' mission essential task list. The unit should review the mission, conduct as thorough a predeployment IPB as possible, assess how the force should be packaged for deployment, and develop deployment plans.

4-5. The **home station** phase begins on the effective date of unit mobilization. Actions during this phase include the inventory and loading of unit property and disposition of an advance party to the MS. Specific tasks and standards are listed in FORSCOM Regulation 500-3-3, and unit movement planning requirements in FORSCOM Regulation 55-1. The units must coordinate directly with the MS prior to departing their home stations. This phase ends with the arrival of the units at the MS.

4-6. The **mobilization station** phase encompasses all actions necessary to meet deployment requirements. Unit command passes from the CONUS to the MS. Actions at the MS include the processing of personnel and equipment and the actual accessioning of the unit into the active structure. This phase also includes any necessary individual or collective training as well as appropriate cross-leveling actions, soldier readiness processing (SRP)/preparation for overseas movement (POM), and validation for

deployment. Patriot system training may include readiness training conducted with training simulators capable of simulating the theater air and missile threat. This phase ends with the arrival of the unit at the port of embarkation.

4-7. The **port of embarkation** phase includes both manifesting and loading of personnel and equipment and ends with the departure of personnel and equipment from the POE.

## DEPLOYMENT

4-8. The deployment process applies to both reserve and active component units and is divided into five phases—

- Predeployment Activities.
- Movement to Port of Embarkation.
- Strategic Lift.
- Theater-base Reception.
- Theater Onward Movement.

4-9. The **predeployment activities** phase takes place during normal peacetime operations. Based on operational requirements of the supported CINC, Patriot units are designated, equipped, and trained with force-projection capabilities in mind. During this phase, Patriot units conduct routine collective deployment training to ensure forces, manpower, and materiel are sufficient to meet the combatant commander's missions. The units also revise their movement plans to reflect the exact equipment being deployed, and conduct the necessary training to attain the desired mission capability. This training may include mission rehearsal exercises conducted with training simulators capable of simulating the theater air missile threat. Patriot units also conduct soldier readiness checks, prepare for overseas movement, and undergo validation checks to ensure readiness for deployment. Predeployment activities for RC units include those listed in mobilization phases I through IV.

4-10. Within the first few hours of an operation or conflict, it may be necessary to put a Patriot minimum engagement capability on the ground. The purpose of the minimum engagement package (MEP) is to provide a strategic responsiveness, using a quick reaction force that would protect units using the required lethality to accomplish the mission. Basic MEPs should be used as a starting point for planning considerations and mobilization. A MEP can be tailorable to fit the mission and tactical situation as needed. The MEP should have an established timeline designated to when the unit should be in place and operational. Specific guidance and checklists should be included in the units' standard operating procedures. The basic MEP consists of an ECS, radar, two launchers, SRPT, HMMWV's with trailers, EPP, fuel tanker, GMT, PAC-2/PAC-3 missiles or both, and sufficient supporting equipment, supplies, rations and personnel to sustain 24-hour operations for 15 days METT-TC dependent. (See Appendix F, Transportability, for detailed MEP description). Note: The basic MEP is deployed into the theater using five C-5A or seven C-17 aircraft and can be employed to defend critical lodgment assets. The number of PAC-2/PAC-3 missiles deployed with the MEP will

vary according to the threat; each launcher will have a full load of missiles plus one reload.

4-11. The **movement to port of embarkation** phase involves moving Patriot units from their home installations to the port of embarkation. Unit activities include updating automated unit equipment lists to deployment equipment lists (DELs) and submitting them to appropriate authorities. Units receive movement instructions from transportation component commands and are advised via movement directives when their equipment is required to be at the POE. Accordingly, units must back plan installation departure and POE processing to ensure equipment arrives at the POE when required. This phase ends when the units and their equipment depart the POE.

4-12. The **strategic lift** phase involves transporting the units and equipment from the POE via air or sea to the POD in the theater of operations. Units develop movement plans to reflect personnel and equipment being deployed and ensure equipment and validation checks are completed. After plans have been made and double checked for weight limits and types of equipment being loaded, Patriot units are then loaded aboard aircraft or sea-going vessels and transported to the port of debarkation.

4-13. The **theater-base reception** phase begins with the arrival of forces in theater. Upon arrival, unit commanders work with the combatant commander's designated representatives in completing the required documents for moving and sustaining forces. This phase ends with departure of the units from the POD.

4-14. The **theater onward movement** phase begins with the personnel and equipment linkup, reconfiguration of forces, sustainment and receipt of pre-positioned war reserve stock at designated marshaling areas. This phase concludes with arrival at the staging areas where combat preparation occurs.

## EMPLOYMENT

4-15. Patriot units may be employed in a variety of operations including entry operations, shaping and decisive operations, post conflict operations, and stability and support operations. Usually, Patriot units will be employed as part of an ADA brigade at EAC or corps, and can be part of an AMD task force along with a THAAD battery. Patriot units may also be employed with other air defense units as part of a multinational AMD task force.

### ENTRY OPERATIONS

4-16. Entry operations are designed to establish and secure a lodgment through which US forces and materiel can enter a theater of operations. If the theater threat includes TMs and/or aircraft, Patriot units or an AMD task force may be deployed early to protect entering forces and critical assets, including airfields and seaports, transportation centers, $C^3I$ activities, and geopolitical assets.

4-17. If the objectives of the deployed forces are not accomplished quickly, the theater will normally transition into a mature theater of operations. The lodgment will thus expand and additional forces with their support and

command, control, and communications elements will enter the theater. Additional Patriot units will also enter the theater and be deployed to defend the massing forces and expanding lodgment. Depending on the type and magnitude of the threat, a robust AMD task force comprised of Patriot, THAAD and SHORAD units may be required to defend forces and critical assets. AMD task force operations are described in Chapter 5, *Operations.*

## SHAPING AND DECISIVE OPERATIONS

4-18. As our maneuver forces advance and move into corps areas, Patriot units may be required to support shaping and decisive operations. Shaping operations are designed to create and preserve conditions for decisive operations. Decisive operations are those that accomplish the task assigned by the higher headquarters. Within a theater, shaping operations may precede, follow, or occur simultaneously with decisive operations. Patriot units support both types of operations by protecting our maneuver forces, thereby reducing their vulnerability, and allowing them to proactively engage and destroy the enemy.

4-19. To support shaping and decisive operations in corps and maneuver areas, Patriot units may employ an alternating "bounding overwatch" maneuver scheme to provide air coverage for maneuver force elements. This scheme involves the use of Patriot remote launch capability, specifically, "bounding overwatch" (leapfrogging) remote launcher groups to extend air coverage into the maneuver areas while minimizing the number of unit moves. Remote launch operations are described in Chapter 5, *Operations.* TTPs for remote launch operations are discussed in FM 3-01.87 and ST 44-85-3.

## POST CONFLICT OPERATIONS

4-20. Post-conflict operations include all operations conducted after the conflict has been terminated. In some theaters, residual enemy forces or terrorist factions may still be capable of launching TM or air attacks from isolated enclaves or areas outside of the theater. In these circumstances, Patriot units may be retained in theater to protect populated areas and to discourage attacks on redeploying forces, materiel, or geopolitical assets.

## STABILITY AND SUPPORT OPERATIONS

4-21. Stability operations are undertaken to promote and sustain regional and global stability, influence political, civil, and military environments, and disrupt specific illegal activities. Some examples of stability operations include peacekeeping operations, humanitarian and civil assistance, counter-drug operations, and counter-terrorism operations.

4-22. Support operations are undertaken to provide essential support, services, assets, or specialized resources to help civil authorities deal with situations beyond their capabilities. Some examples include disaster relief, humanitarian relief, support to civil law enforcement, and community assistance.

4-23. In some of these situations, terrorists or other rogue elements may use TMs or aircraft to disrupt normal civil and political activities or threaten

stability. When appropriate, Patriot units may be employed to protect the civilian populous or geopolitical assets from terrorist attack. Patriot units also protect the force from enemy aerial RSTA, thereby promoting stability and discouraging threat factions.

## REDEPLOYMENT

4-24. After the cessation of conflict, some Patriot units may be redeployed along with other forces to home stations or to new theaters. The redeployment process consists of six phases—

- Reconstitution for strategic movement.
- Movement to redeployment assembly areas.
- Movement to port of embarkation.
- Strategic lift.
- Reception at port of debarkation.
- Onward movement from port of debarkation.

### RECONSTITUTION FOR STRATEGIC MOVEMENT

4-25. Reconstitution normally takes place in TAAs, where Patriot units initiate cross-leveling, repack and load containers, and reconcile unit movement dates through documentation, accountability of inventory, perform maintenance, and coordination of movement instructions.

### MOVEMENT TO REDEPLOYMENT ASSEMBLY AREAS

4-26. Upon receipt of movement instructions, Patriot units move to the RAAs. At the RAAs, units complete activities that were not accomplished at the TAAs. These activities may include washing major end items, labeling equipment, performing needed maintenance, obtaining US Customs and Department of Agriculture inspections, and finalizing unit movement data and property books. Units also initiate personnel actions including processing decorations and awards, processing OERs and NCOERs, completing records and finance updates, etcetera

### MOVEMENT TO PORT OF EMBARKATION

4-27. In this phase, Patriot units move to the POE where they are processed for strategic movement. This processing includes configuring and inspecting cargo and passenger loads and verifying the final manifest and documentation.

### STRATEGIC LIFT

4-28. Force projection and sustainment success is based on the strategic mobility (airlift, sealift,) of getting equipment where it needs to be. Deploying forces can improve the impact of these types of mobility by preparing unitized loads of ammunition, supplies, and equipment

### RECEPTION AT PORT OF DEBARKATION

4-29. Upon arrival, Patriot units must coordinate the onward movement to their follow-on destination. Unit personnel must work with the military

traffic management command, supporting installation transportation officers or theater army movement control agencies in completing the required documents for moving forces, sustaining equipment and supplies to the final destination.

### ONWARD MOVEMENT FROM PORT OF DEBARKATION

4-30. This phase begins with the reconfiguration of forces and sustainment equipment and supplies at a designated marshaling area. It concludes with their arrival at their destination. Units should deploy in increments–advance party, main body, and rear detachment. The size of the unit, the requirement to support sustainment operations and the transportation assets impact on the number of increments needed. As units prepare for and actually move during redeployment, installation commanders should plan and prepare for reunions. This planning helps prepare the soldiers and their families to reunite.

4-31. The supporting installation's commander is responsible for the health, welfare, and support of arriving forces and for assisting with their movement back to their home stations or to new stations in accordance with movement plans. In this capacity, he sustains the forces and individuals until they arrive at their prescribed destination. This may require assisting them in airlift, commercial and military highway, military convoy, rail or other modes for moving forces and individuals to their proper destination, or follow on locations. These locations may be either former (home stations) or other locations for deployment.

4-32. Other considerations needed during redeployment are support, cargo, supplies and materiels, custom regulations, and logistics requisitions. All of these factors must be considered by the chain of command to ensure a smooth transition back to their home station. Types of support needed for the redeployment may include medical care, life support, and everyday use supplies.

## SUSTAINMENT

4-33. Sustainment operations involve providing and maintaining adequate levels of personnel and materiel for the duration of a campaign. Primarily the Patriot battalion S1 and S4 staffs perform sustainment activities. They focus on how, when and where to accomplish the sustainment functions of manning, arming, fueling, fixing, moving, securing, and sustaining soldiers and equipment:

- **Manning** ensures Patriot battalions and batteries are staffed with the right numbers and types of personnel to accomplish the mission.
- **Arming** ensures Patriot batteries have the right mix and quantities of missiles at the time and place needed.
- **Fueling** ensures sufficient quantities of petroleum; oils, and lubricants are available to support current and planned operations.
- **Fixing** ensures that critical Patriot equipment is operational and that failed systems are quickly returned to operational status.

- **Moving** ensures adequate transportation resources (vehicles, control procedures, movement planning and terrain deconfliction) are available to support operations. With Patriot units dispersed throughout an AO, moving missiles and equipment, and delivering repair parts become critical sustainment functions.
- **Securing** ensures the sustainment area is adequately defended and secured against hostile activities.
- **Sustaining soldiers** ensure personnel services, health services, field services, quality of life, and that general supply support is adequate.

## Chapter 5

# Operations

This chapter discusses Patriot unit's offensive and defensive operations. It describes how Patriot is employed in the corps and EAC to protect forces, critical maneuver assets, and geopolitical assets, and how the Patriot's remote launch (RL) capability and how the capability is used to increase defensive coverage and maintain firepower when critical equipment is lost. It also describes air and missile defense task force (AMDTF) operations and the role Patriot units play in planning and executing these operations. Finally, it describes Patriot unit $C^3I$ operations and Patriot units' management of the air and missile battle.

## OFFENSIVE OPERATIONS

5-1. During offensive operations, Patriot units' missions are to provide air and missile defense of critical assets. To support an offensive ground operation, EAC Patriot may be deployed to augment the corps ADA brigade by protecting corps rear area assets. This allows corps ADA units to concentrate their efforts forward providing weighted protection to the corps' main effort. This may involve fighting Patriot as units or forming an AMD task force, depending on METT-TC. In addition, forward-deployed Patriot units, belonging either to the corps or to EAC, influence the corps deep battle by augmenting corps and division ADA units with greater firepower and range. Patriot units' ability to simultaneously engage large numbers of attacking aircraft, TBMs, standoff jammers, and specific aircraft at relatively long ranges, allows the ground commander freedom to execute the deep battle.

5-2. Patriot commanders should consider and plan for long-range engagements against enemy aircraft attack packages. While the Patriot system's probability of kill (Pk) may be reduced for such targets, the disruptive effect may be worthwhile especially against a poorly trained or motivated enemy.

5-3. Patriot units should attempt to identify enemy aircraft packages, recognize the flight leaders, and selectively engage them, either before or after attack by friendly AD fighters. This type of engagement requires extensive coordination. Coordination is made through the identification and engagement authority of that theater. Synchronization of effort will yield better protection of friendly units and assets.

5-4. Patriot units in the forward area should make the most of the system's capability against the jamming threat. Specific batteries should be designated for the mission of engaging standoff jammers, as this type of engagement reduces the system's ability to simultaneously engage aircraft and TBMs. For more details on SOJC engagements, see FM 3-01.87.

5-5. Patriot battalions may be task organized with THAAD batteries to form air and missile defense task forces (AMDTF). While the focus is on the TBM

fight, Patriot will retain its traditional air and missile defense mission and, in fact, expand the threat set, which it is designed to protect against. Normally the AMDTF will employ Patriot to protect the THAAD battery from all aircraft threats, CM threats, ARMs, and short range TBMs.

## PRIORITIES

5-6. Corps Patriot battalions and batteries providing air defense to offensive operations must maintain air defense over the corps main effort to preserve the initiative. Top priorities are providing protection to the maneuver units that form the main effort and to their support facilities, $C^3$, logistics operations, and reserve forces. The Patriot battalion participates in the integrated theater air defense, which gives it access to early warning and intelligence information critical to the offensive effort and to the effectiveness of corps and divisional ADA units.

## THREAT

5-7. The main objective of enemy air operations against friendly offensive operation is to destroy our ability to synchronize. The main threats to offensive operations that Patriot must be prepared to counter are—

- The TBM threat that targets critical corps and theater assets.
- The FW threat that attempts to target the same critical assets.
- RW jammers and attack helicopters that penetrate short-range air defense (SHORAD) units.
- Direct actions by special operation forces.
- Electronic attack against Patriot $C^2$ and radar systems.
- The enemy's potential use of air platforms for reconnaissance and targeting.
- UAVs that can be used for attack, surveillance, deception, jamming, decoy, or harassment operations. They can be also be used against targets or in support of other forces conducting offensive operations.

## ALERT STATES

5-8. Alert states represent the degree of readiness of ADA units, from the time of alert notification, to the time of engagement capability or battle stations. The decision as to which to degree of readiness to implement is METT-TC dependent and determined by the commander in coordination with the JFACC, AADC or AAMDC as appropriate. Additionally alert states may be used to specify personnel and manning requirements. Utilizing alert states allows for maximum flexibility to conduct training or maintenance while meeting mission requirements.

## RULES OF ENGAGEMENT

5-9. Rules of engagements (ROEs) are the positive and procedural management directives that specify circumstances and limitations under which forces will initiate or continue combat engagements. The JFC approves all theater ROEs. These established ROEs enable the AADC to retain control

of the air battle by prescribing the conditions in which the engagements take place. ROEs apply to all warfare participants in the theater and go to all echelons of air, land, and sea forces.

## CORPS PATRIOT EMPLOYMENT IN THE OFFENSIVE

5-10. The supported commander's intent is the driving force for Patriot employment during offensive operations. Offensive operations during force-projection operations may be extremely fluid. Patriot units can expect rapid transition from defensive to offensive or to exploitation operations. Deep operations and rear area battles are likely to be conducted simultaneously. To support such fluid operations, Patriot must move quickly and efficiently to provide air defense of friendly attacking forces and their support base. When risk must be taken, battalion commanders may influence the battle by pushing the flow of missiles and fuel to batteries most likely to have a positive effect on the battle, while restricting the flow of those assets to batteries facing less opposition. Launching stations may be redirected from one unit to another to allow heavily engaged units to continue the fight.

### Preplanning

5-11. An attacking force is most vulnerable to air attack during a movement to contact. Because Patriot units cannot shoot on the move, and move more slowly than other corps maneuver units, positioning must be planned in detail before the operation begins. Patriot coverage of highly mobile movements to contact can be maintained by several methods.

5-12. **Forward coverage.** Patriot batteries may be placed close to the line of departure (LD) for two reasons. This ensures that initial coverage can be maintained for at least several hours, and it places batteries in the forward area where they must be at the onset if they expect to be able to cover a mobile force when it contacts the enemy force. Once the force has crossed the LD, Patriot units must have priority for movement to ensure movement in a timely manner in order to provide coverage.

5-13. **Detailed planning.** Before the operation begins, the battalion S3 should identify, by map reconnaissance or other means, as many suitable positions for Patriot batteries as possible along the axis of advance. Each battery should know in advance which positions it will most likely occupy, and when they should be operational. Actual use of these positions is dependent upon reconnaissance by the battery's reconnaissance, selection, and occupation of position (RSOP) team. See Appendix G for RSOP guidance and checklists. For this reason, battery RSOP teams and battalion survey crews should be considered for placement with lead elements as a means to speed reconnaissance and selection of positions. Prospective positions for Patriot batteries should be coordinated through the ADA brigade S3, if possible, so that use of the land may be deconflicted with other corps units.

5-14. **Bounding overwatch.** Using the bounding overwatch (leapfrog) method to move units or remote launcher groups forward ensures that Patriot coverage moves forward with the force. Batteries located near the LD provide initial coverage see Figure 5-1 for illustration. Designated batteries

move forward behind attacking forces to preplanned positions along the axis of advance. When they become operational, the batteries at the LD move to forward positions, and so on, to the conclusion of the operation. This is a very difficult operation for Patriot units. Keep in mind these considerations:

- The number of Patriot batteries to be kept operational at any one time is dependent upon METT-TC. The speed of the attacking force and the number of enemy aircraft, CMs, ASMs and TBMs expected to oppose the attack are factors to be considered when determining the number of batteries to move at one time.
- Remote launcher group's phase-1 (RL-1) can be used to extend ballistic missile coverage, with some utility against medium to high altitude AC and CMs, and minimize the number of unit moves. (See discussion on remote launch capability later in this chapter).
- Remote launcher phase-3 (RL-3) is normally used to counter the TBM threat.
- Command and control of AD engagements during a highly mobile operation is extremely difficult. Prevention of surface-to-air fratricide must be a primary consideration. ROE for enemy aircraft must be clearly defined and widely disseminated. ROE for enemy missiles are less critical, but should also be clear and concise. Every source of target information data must be exploited fully.
- Patriot units cannot hope to provide TBM protection for attacking forces except at the LD and just beyond the LD. TBM protection should be planned for $C^3I$ nodes and for logistical locations, as these can be more readily defined, are not as mobile, and are more likely to be targeted by these weapons.
- Patriot is a soft target and can be taken out of the fight temporarily or permanently if it is placed within tube artillery range or direct weapon fire range,

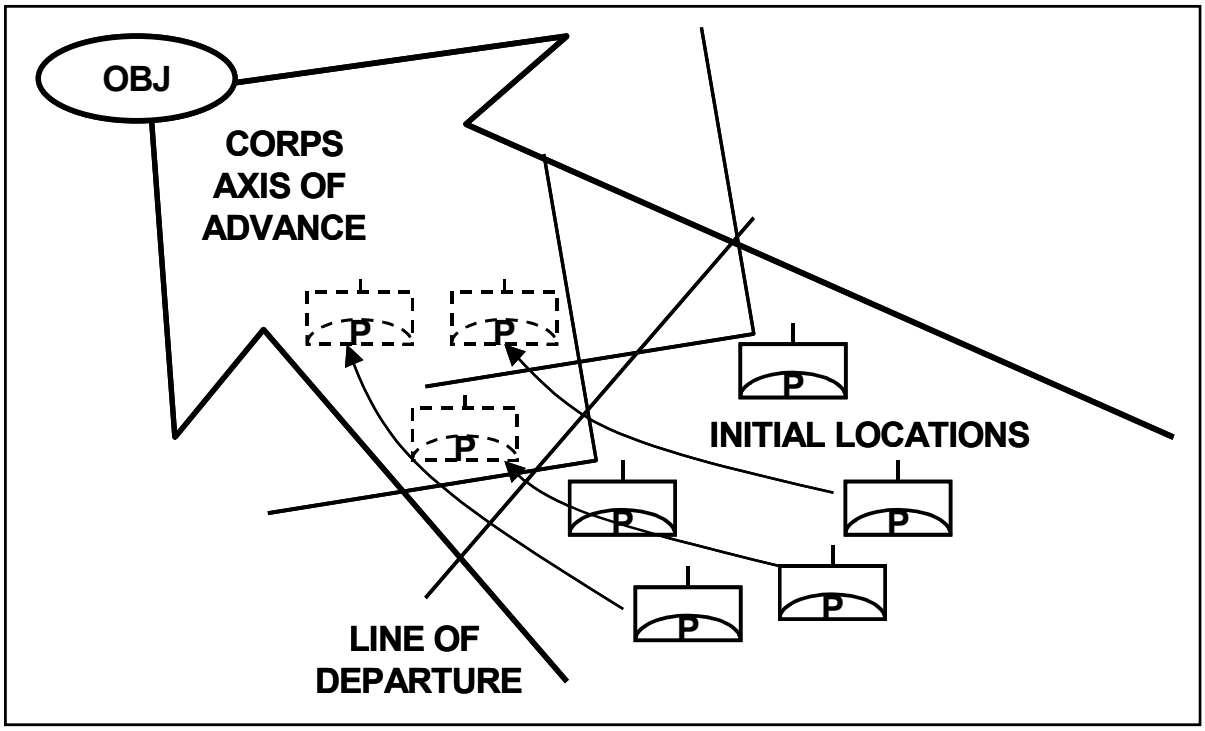



**Figure 5-1. Bounding Overwatch Patriot Batteries**

**Focus**

5-15. Patriot units must stay focused on the threat. When the primary threat is missiles, batteries must be placed near or with the assets being protected. When the primary threat is aircraft, this is not the case. TBM defense design is based on launcher locations. The footprints used by the TCS are related to the defended area for the launcher, not the radar. Assets can be covered with remote launch capability. In order to cover assets, establishment of the TBM defense design around the footprints for the expected threat must be made. There are three separate locations where launchers may be positioned to defend assets: local launchers, RL-1 remote launchers, and RL-3 remote launchers. The radar PTL orientation must be pointing towards the center of the threat launch location NAIs.

5-16. Planners should keep in mind the most likely AAAs, as well as the locations of enemy airfields, when determining where to place batteries. Figure 5-2 shows a possible placement of batteries to protect the flank of a corps movement to contact from air attack.

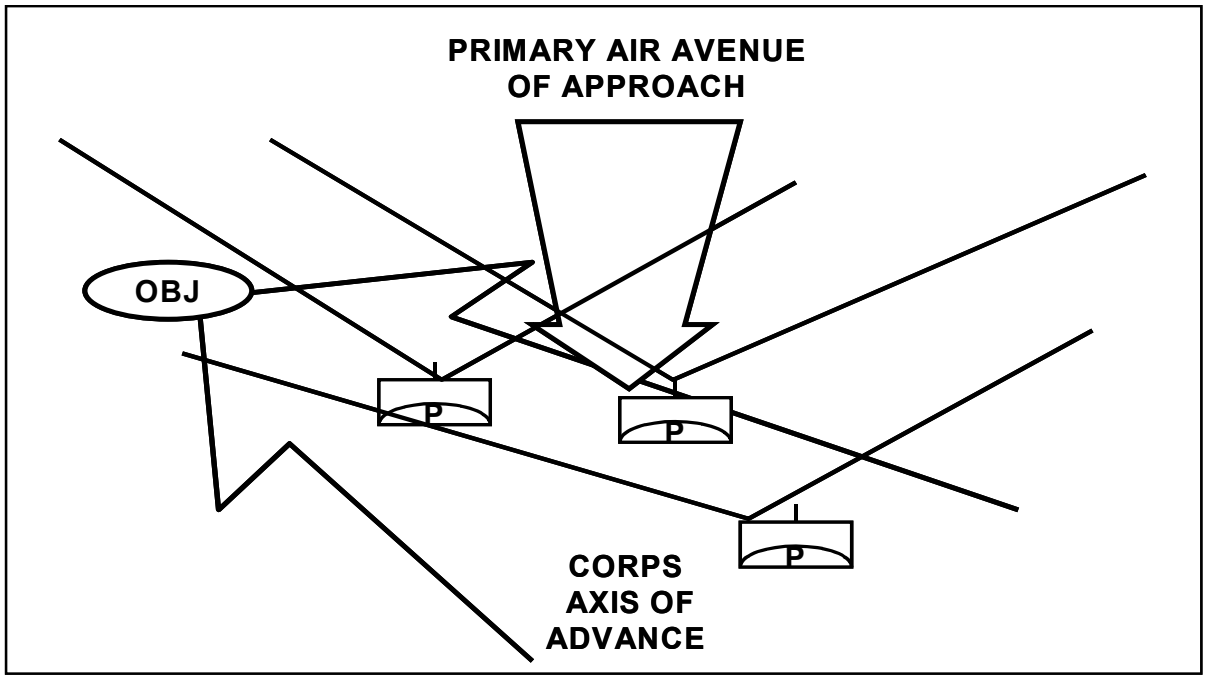



**Figure 5-2. Focusing on the Threat**

### CONCLUSION

5-17. FM 3-0.87 states that successful offensive operations include the tenets of depth, synchronization, and agility. Patriot's contribution to offensive synchronization is to provide air defense to forces and assets at the critical time and place. Patriot's ability to look deep into the enemy's AO, simultaneously engage numerous threats at all altitudes, and react quickly to changing situations is the key to shaping the third dimension of the offensive battle.

## DEFENSIVE OPERATIONS

5-18. The ultimate objective of any defensive operation is to seize the initiative from the enemy so that offensive operations may be mounted. Commanders must see Patriot's contribution to defensive operations as offensive in nature. Patriot units must aggressively attempt to disrupt the enemy's air campaign to the point that synchronization between air and ground offensive operations is not possible. Patriot battalions and batteries accomplish this by locating air and missile threats, providing protection to theater and corps critical assets, and by massing firepower forward against the avenues of approach to those assets.

5-19. Coordination must be made with the identification and engagement authority in that theater. Additional efforts must be made to synchronize Patriot fires with the Air Force or other service air defense aircraft. The threat of surface-to-air fratricide is greatly magnified during defensive operations, especially if the enemy has enjoyed any success in targeting friendly $C^2$ structures.

## THREAT

5-20. There are seven major threats that Patriot battalions and batteries must counter during defensive operations to degrade the enemy's ability to synchronize. These threats include enemy TBMs, CMs, FW, RW, ASMs, UAVs, and ECM. TBMs and CMs will target the lodgment area, $C^3I$ nodes, and AD sites including air bases. FW aircraft will be programmed against the same targets. RW performs close air support (CAS) and battlefield air interdiction (BAI) operations that directly support ground operations. The ECM threat that targets ADA radars, $C^3I$ nodes, and communications must be disrupted.

## PATRIOT EMPLOYMENT

5-21. Use of Patriot in defensive operations will differ depending on where the battalion is employed. The demands for rear areas differ significantly from those of forward areas. Employment, specifically separation distance between batteries and battalions, proximity to the FLOT, and distance from an asset, should be planned out by all levels and addressed in operation orders. Consideration must be made about the positioning of MANPADS. The area behind the radar (dead zone) is the most critical region during operations, and degrades to protect. However, during march order, emplacement, movement and nonoperational status a more balanced approach is needed from the MANPADS team due to being more visible.

5-22. The position of Patriot firing batteries depends on the ability to achieve overlapping fires, defense in depth, and weighted coverage to help underlie the strategic effectiveness of air defense on the battlefield. Four AD employment principles that help with the overall protection of the assets are **mass, mix, mobility,** and **integration**. The balanced application of these principles to fit the needs of the tactical situation can enhance the effectiveness and survivability of air defense.

5-23. In conjunction with the employment principles, the six ADA employment guidelines also assist with the survivability of air defense units. Based on the tactical situation and availability of AD assets, applying all of the guidelines in all tactical situations is seldom possible. These guidelines are—

- Balanced fires.
- Weighted coverage.
- Early engagement.
- Defense in depth.
- Mutual support.
- Overlapping fires.

## CORPS

5-24. Patriot forces in the corps area engage TBMs, CMs, UAVs, ASMs, and aircraft directed against maneuver units and their sustainment facilities. These units also engage enemy aircraft attempting to penetrate to rear areas. Thus, Patriot units in forward areas must counter all the threats noted above. Forward Patriot battalions must also provide early warning for corps,

division, and higher echelons, as well as integrate with SHORAD battalions and sensors.

### ECHELONS ABOVE CORPS

5-25. Patriot in areas controlled by EAC must protect critical assets from TBMs, CMs, and aircraft. Because Patriot's capability forces prioritization of assets for TBM protection, all assets will receive the degree of protection assigned to them by the DAL. Again, early warning must be exchanged with adjacent and higher echelon AD forces.

## DEFENSE DESIGNS

5-26. At the ADA brigade level (macro defense design), developing defenses is largely a matter of determining force allocation, task-organizing when appropriate, defining the zones and areas of responsibility within which subordinate battalions or task forces will operate, and constructing the $C^3$ architecture to support the AD operation. At the battalion or task force level (micro defense design), designing defenses involves maximizing Patriot system potential against the threat. It includes planning initial and follow-on positions, determining PTLs, allocating special missions to specific batteries, defining assets to be protected, and planning the necessary communications routing. The technical and system details of defense design are discussed at length in FM 3-01.87 and in FM 3-01.13 (S/NF).

5-27. At all levels, defense development is a continuous, interactive process. The battalion commander normally starts the process for his battalion by giving his guidance as a statement of intent and a concept of operations. Defense development is based on the following possible missions for Patriot battalions–

- Pure air defense.
- Pure TBM defense.
- Air-heavy defense.
- TBM-heavy defense.
- TBM/air balanced defense.

5-28. Once guidance for concept of operation and intent have been specified, the battalion S3 begins the detailed work of defense design. Batteries' locations, PTL designations, system initialization, and communications must be worked out.

### CONVERGENT PTLS

5-29. Because Patriot is a sectored system, the orientation of the firing batteries takes on additional importance. Conceptually, the firing batteries can be oriented so that their PTLs are convergent, divergent, or parallel for air threats.

5-30. Patriot fires are more effective against the air threats when convergent PTLs are used. As shown in Figure 5-3, each Patriot battery's PTL converges on the PTL of at least two other batteries in the defense. Ideally, the PTL of

each unit will converge on all other units in the battalion. Convergent PTLs are most effective when applied to known avenues of approach (AAs). Convergent PTLs are also effective against FW aircraft attempting to establish air corridors in forward areas. The exact orientation of battery PTLs depends upon the METT-TC. The battalion should propose PTLs as part of the defense design process, but final defense designs have to be reviewed and approved by the brigade.

5-31. Convergent PTLs provide mutual support and defense in depth. They concentrate firepower to one area while sacrificing some of the additional area that could be gained by parallel or divergent PTL orientation. However, the protection provided by employing convergent PTLs can be sustained longer because it is less sensitive to loss of units than a deployment that uses parallel or divergent PTLs. More important, convergent PTLs make the Patriot system more effective against raids using escort or self-screening jammers by allowing the system to triangulate to provide range.

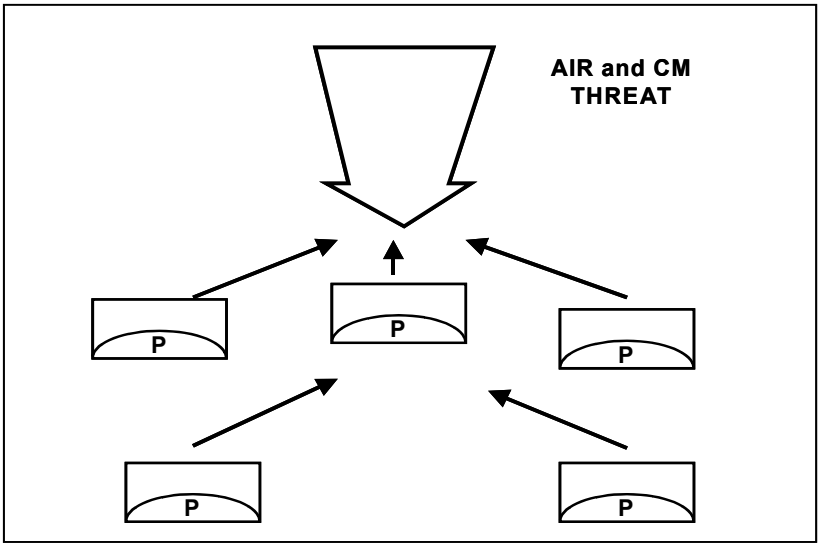



**Figure 5-3. Convergent PTLs**

## DIVERGENT AND PARALLEL PTLS

5-32. Against the aircraft and CMs divergent and parallel PTLs allow the battalion S3 to provide Patriot coverage to larger areas than when using convergent PTLs. This occurs at the expense of concentration of firepower and it reduces system electronic counter-countermeasures (ECCM) capability. However, in many circumstances, the considerations of METT-TC will not allow the use of convergent PTLs. For example, if the battalion area of responsibility is too large to allow batteries to be positioned using convergent PTLs, or if too few batteries have been allocated to the defense, then divergent PTLs may be required. When threat AAs requires acquisition and firepower in different directions, the S3 may not be able to use convergent PTLs.

## SECONDARY TARGET LINES

5-33. Secondary target lines (STLs) need to be carefully planned to sustain the AD protection of the supported unit or asset. They should also be planned for contingencies and to cover possible catastrophic failures. Launcher siting must support the use of STLs. See FM 3-01.87 for guidance on the siting of launchers.

## TBM DEFENSES

5-34. When developing defenses against TBMs, convergent PTLs are important to the overall design and are necessary in providing overlapping coverage that is needed for mutual support. TBM defense design is done first. Each battery's PTL should be oriented toward suspected TBM launch sites.

5-35. PTLs and STLs are also important to radar emplacement. Radar location is determined to allow optimal defense using the launcher footprints. PTL and STL orientation toward the TBM NAIs location is critical. The NAIs may include the positions where threat TBMs may be launched. During the planning of the FU locations and PTLs, the search sector must consider the NAIs. The radar search sectors must be evaluated to prevent exceeding 100% of the operational performance loads. Many technical aspects are involved with the positioning of the FU and the PDB-5 (configuration 3) AN/MPQ-63 radar. The technical aspects include use of TBM Intercept Geometry and Tailored Search. When there is limited intelligence as to the exact location of the threat launchers, the default TBM NAI may be large and the standard search must be used.

### TAILORED SEARCH

5-36. Tailored search is used to when valid NAI locations are determined. Tailoring the search beams is based on valid IPB threat launch azimuths, remote launcher locations, and asset boundaries. The tailored search beams allow the radar to focus and extend the TBM search sector to counter the longer-range TBM threat. The additional benefit is significant reduction in radar resources required to accomplish TBM search functions. Although this does not increase the footprint or Pk, tailored search increases the time frame for the system operator.

5-37. When entering threat information, every launch is considered an NAI when processing data; care should be taken to ensure every known location is derived from the S2's ground IPB. This data is necessary to ensure valuable radar resources are maximized and not wasted. If excessively large launching areas are defined, and or excessively advanced threats are defined, the FU runs the risk of degrading the overall defensive posture by reducing the number or coverage of defendable assets.

5-38. The Patriot system automatically controls the search sectors employed by the REP 3 radar to provide maximum defensive coverage of the FU and their assets. The TBM tailored search beams enhance surveillance along search azimuths for valid TBM NAIs. Priority should go to known launch areas. Use the intelligence data provided by the S2 whenever possible to establish tailored TBM search sectors. Expanded search capabilities are only available with the Config 3 radar. Figure 5-4 illustrates tailored search using both short and long-range targets.

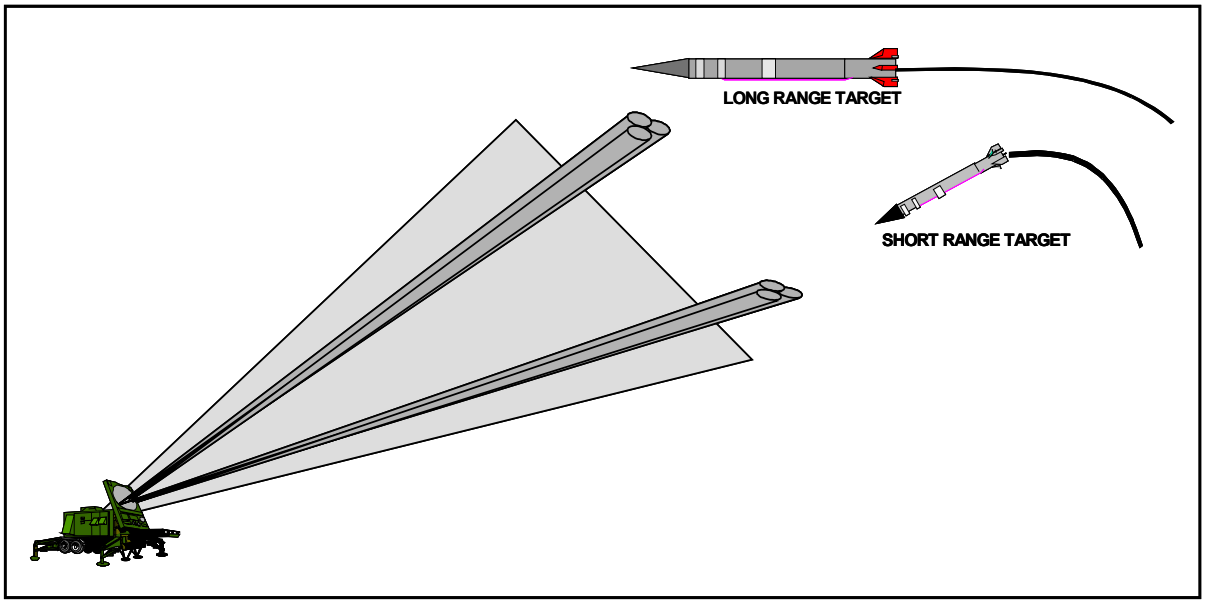



**Figure 5-4. Tailored Search**

### Default Scenario

5-39. The default scenario for tailored search is used when there is limited NAI intelligence on valid enemy TBM launch areas. The default scenario is a self-defense plan that is used when the threat is not known. FM 3-01.13 (S/NF) addresses the technical details of a TBM defense, and FM 3-01.87 addresses tactical software issues, but the S3 should follow these general guidelines–

- Plan for the most likely threat COAs that the S2 has templated. The commander's guidance may require the staff to develop options based upon certain aspects of the S2's most dangerous COAs and incorporate those options into one.
- Identify the proper PTL for each battery with respect to the TBM threat. The closer a TBM flies to the PTL, the more reliable system engagement processing becomes. As a rule, the closer the battery is to the TBM launch site, the more important the PTL selection is.
- Do not skew the ATM search sector. This should be done only when the TBM approach can be reliably identified as different from the main air AA.

- Place batteries as close to protected assets as possible. The rule of thumb is that the closer the battery is to the TBM ground impact point (GIP), the higher the Pk.
- Maximize the use of TBM surveillance. When the battalion's mission is providing asset protection, the majority of batteries should be in TBM surveillance mode.
- Distribute missile types relative to the threat. The Patriot missile inventory includes five different missile types. They are referred to as the standard, SOJC, ATM, ATM1, and ATM2 missiles. The standard and SOJC missiles are also referred to as PAC-1 missiles, while the ATM missile is the PAC-2, and the ATM1 missile is the GEM. The PAC-3 is also known as the ATM2 missile. A mix of the missiles within the battery is recommended for the various threats. All of the missiles may be mixed on the launchers except for PAC-3. There can be no mixing of PAC-3 and PAC-2 missiles on the same launcher. See FM 3-01.87 for further guidance on missile distribution and placement of missiles on launchers.
- Fight in the automatic TBM engagement mode. The system is designed to fight in the automatic TBM engagement mode. When the system has classified a target as a TBM, engagement decisions and the time in which the operator has to make those decisions are very limited.
- Overlap TBM coverage. Do this for mutual support between batteries and to thicken the defense by sharing assets between batteries. When possible, batteries should be placed within 20 kilometers of another battery to ease the planning process of sharing assets.

## STABILITY OPERATIONS AND SUPPORT OPERATIONS

5-40. Patriot may be required to participate in stability operations and support operations to promote and sustain regional or global stability or to discourage terrorists or rogue elements from disrupting the normal civil or political activities within a host nation. Stability operation and support operations may involve defending the host nation against TM or air attacks using defensive operations and or employment strategies described in this chapter. The forces and equipment required for each operation are dependent upon METT-TC. Some stability operations and support operations will require deployment of a minimum engagement package, while others may require a tailored AMD task force.

## REMOTE LAUNCH

5-41. During the conduct of offensive, defensive, or stability operations and support operations, Patriot’s remote launch capability may be employed to increase defensive coverage, improve flexibility in defense designs, or maintain fire power in situations where critical equipment becomes lost or inoperable. Patriot’s phase-one remote launch (RL-1) capability allows launching stations (LSs) to be emplaced up to 10 km from the controlling ECS, while Patriot’s phase-three remote launch (RL-3) capability allows

launcher groups (two or more LSs) to be emplaced up to 30 km from an associated RS.

5-42. Patriot RL3 capability allows the ECS to control one local and three remote launcher groups. It also allows the control of remote launcher groups to be transferred from one ECS to another in situations where an ECS has sustained equipment losses. A battery employing both RL-1 and RL-3 capabilities is shown in Figure 5-5.

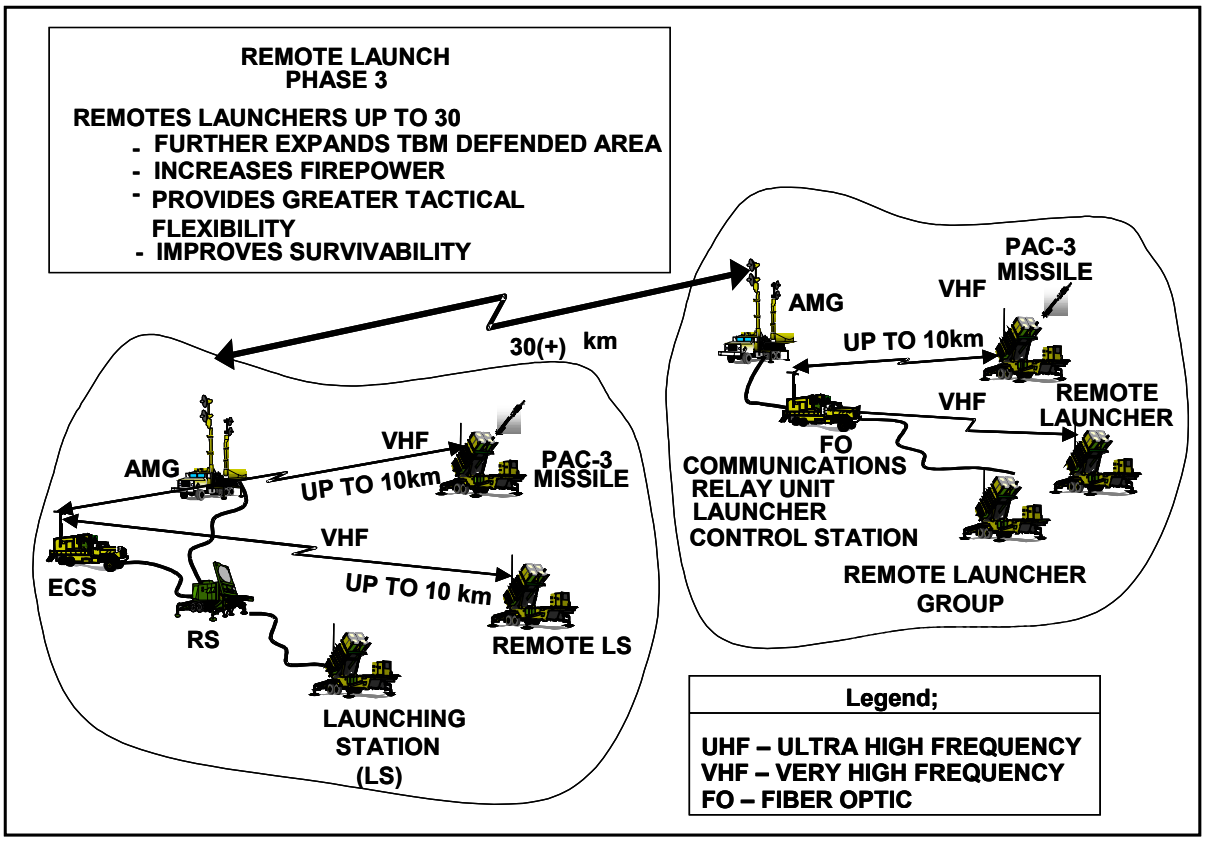



**Figure 5-5. Patriot Remote Launch Capability**

## REMOTE LAUNCH EMPLOYMENT

5-43. The decision to employ remote launch capability is based on METT-TC. RL capability may be needed when assets requiring protection are widely dispersed, but it can be employed only if terrain allows LOS communications to be established.

5-44. In the PAC-3 system, the launchers must be within the surveillance sector. The following guidelines must be considered in planning RL operations–

- RL-3 capabilities are normally used only for TBM defenses. Defended area varies with threat. Defense planners should recognize that the size of the "footprint" (area around a launcher in which assets can be defended) varies with TBM type, characteristics, and launch profile.

The defense design process should ensure that the final design is balanced in order to be effective against the most likely as well as the most stressing threat.

- RL should be employed only if local launchers cannot accomplish the mission. An RL operation significantly increases manpower, logistical, and security requirements. RL should be employed only after making every effort to meet requirements with locally deployed launcher platoons and taking advantage of upper-tier systems to protect widely dispersed assets from TBMs.
- Remote launchers must be sited within the radar surveillance sector, and should be within the maximum remote launch distance of the greatest number of battery fire control sets (ECS and RS) that defense requirements and terrain will allow. This will maximize the availability of firepower and the ability to dynamically reconstitute.
- The remoting of launchers for air threat protection is not recommended due to extended dead zones. When an ECS assumes control over another FU's launcher sections that are protecting assets from airthreats, the extended low altitude dead zone may not allow adequate protection. The dead zone surrounding an LS is relative to its emplacement range from the radar and expands from the LS out to a given distance along the LS emplacement azimuth. The dead zone is not a discriminating factor for TBM defense.
- RL-3 provides a marginal improvement from the RL-1 in the ability to engage medium-to-high altitude, high-speed aircraft at maximum effective ranges.

## AMD TASK FORCE OPERATIONS

5-45. In theaters where the threat includes a mix of medium range ballistic missiles (MRBMs), short-range ballistic missiles (SRBMs), other TMs, and aircraft, an AMD task force (AMDTF) may be employed to protect forces and high-value assets. The AMDTF is normally comprised of a THAAD battery and several Patriot batteries under the control of a TF TOC (Patriot ICC/TCS), as shown in Figure 5-6. The AMDTF may also include SHORAD units.

5-46. The primary advantage of an AMDTF is that it provides a higher level of protection than is achievable with a single system. The THAAD and Patriot Advanced Capability-3 (PAC-3) weapon systems will provide a two-tier defense for high value assets located under their protective envelope that denies the enemy a preferred attack option. THAAD provides the upper-tier defense against MRBMs and is needed to provide near leak proof defense against SRBMs in the common target set, while Patriot provides the lower-tier defense against SRBMs, other tactical missiles (CMs and ASMs), and aircraft. TBM tracks are handed-off to the lower-tier by THAAD in time for Patriot to engage at optimum range and altitude, and to obtain an intercept above a prescribed keep-out altitude minimizing the effects of weapon of mass destruction. SHORAD units supplement lower-tier defenses, by providing additional protection against low altitude FW, RW, UAV, and CM threats. The Patriot battalion normally provides the task force command and control.

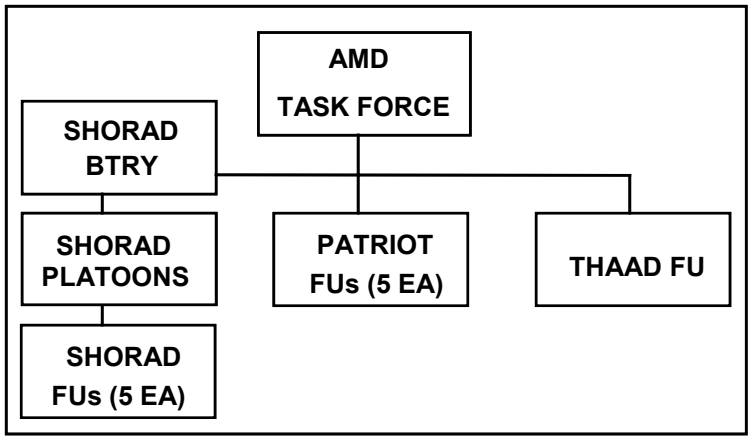



**Figure 5-6. AMD Task Force**

## PLANNING CONSIDERATIONS

5-47. To properly implement an AMDTF, task force planners should have a detailed knowledge of the threat. They must also understand the capabilities and limitations of all systems that comprise the task force, and have a working knowledge of THAAD, Patriot, and SHORAD system software and communications. Planners should refer to applicable manuals for technical details and specifics on system performance and software capabilities and limitations.

5-48. The task force will normally receive the mission, defense priorities, and commander's intent from higher headquarters. After assessing METT-TC and developing a detailed IPB, planners develop level of protection requirements; taking into consideration the JFC defended asset list and CVRT assessments. The level of protection requirements drives the allocation and positioning of resources as well as system initialization, firing doctrine, and integration of fires.

5-49. Task force planning requires cooperation and close coordination among Patriot, THAAD, and SHORAD planners. In planning task force defenses, THAAD defense design is first developed. This involves determining the upper-tier search requirements, establishing the PTL(s), determining the optimum FU location, emplacing the radar and launchers, and planning communication links within and external to the THAAD battery, including linkage with the AMDTF TOC. Planners next develop the Patriot defense design, which involves determining the lower-tier search requirements, establishing PTLs, emplacement of the radar, LCSs and launchers, and planning communications links within and external to the Patriot battalion.

5-50. This planning results in an AMDTF defense design, illustrated in Figure 5-7. This example shows five Patriot FUs and a THAAD FU. The THAAD FU is capable of defending selected assets against MRBMs and some SRBMs. Normally; THAAD is initialized to protect the lower-tier Patriot FUs.

5-51. The Patriot FUs are capable of defending selected assets within their respective lower-tier defended areas (LTDAs). An LTDA is defined as a two

dimensional, multisided area that represents a region where Patriot has both defended assets and engagement capability against TBMs. LTDA coverage is a function of a number of factors including the type of threat, threat location, threat attack vectors, FU PTLs, Patriot missile type, and remote launcher placement. An LTDA can be extended or enlarged using Patriot's RL-3 remote launch capability.

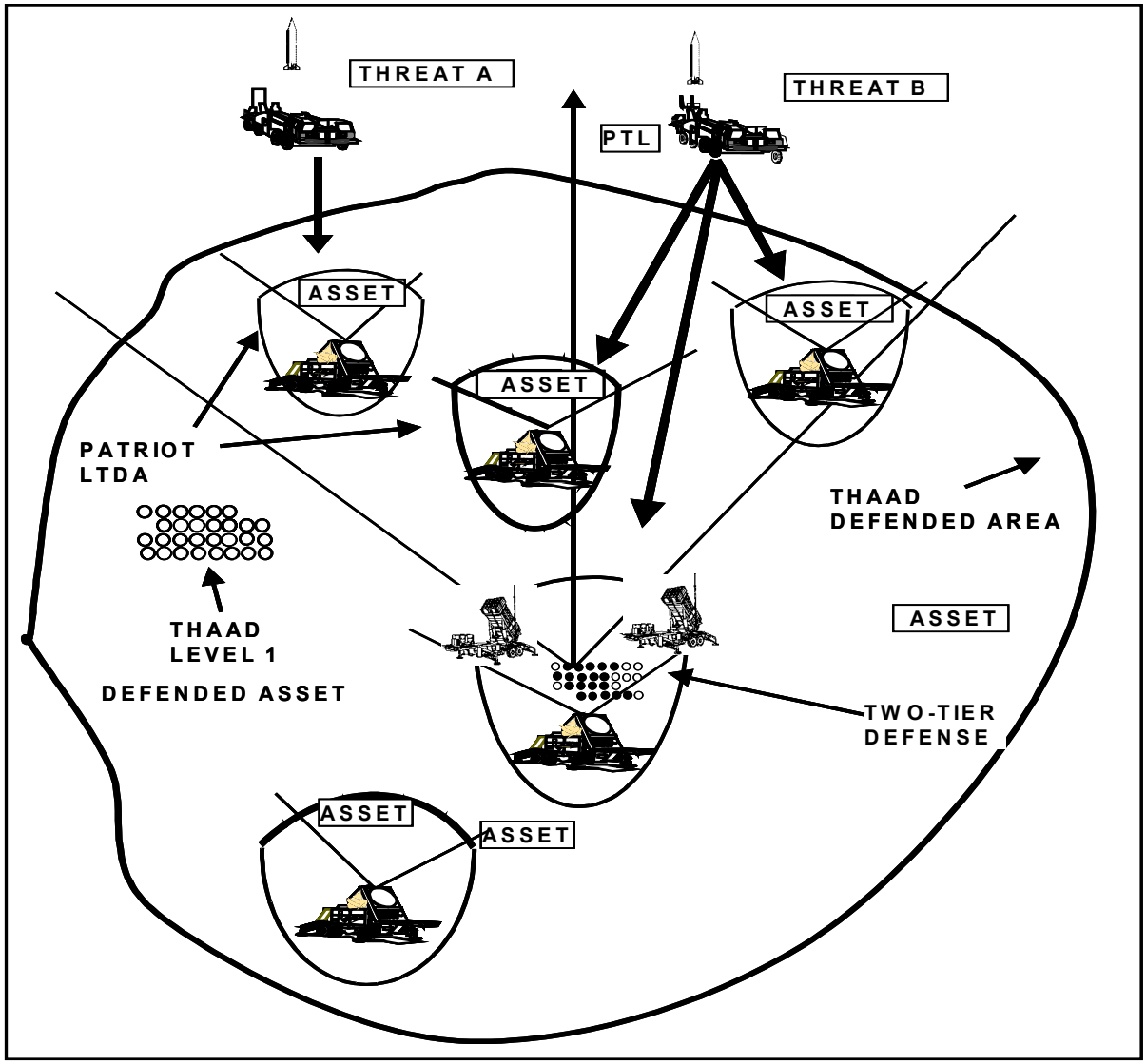



**Figure 5-7. AMDTF Defense Design**

5-52. Assets that require the highest level of protection (near-leak proof protection) must be located within both the THAAD defended area (the area that is designated for some level of protection from higher) and an LTDA (TBMs must be in the common target set). Assets that require lower levels of protection must be located within either the THAAD defended area or an LTDA. In either case, Patriot and or THAAD FUs must be initialized to defend specific assets.

5-53. Along with THAAD and Patriot, consideration must be given to how SHORAD operates with these units in planning the defense design. Defense design planning must include the location, communication links, and how Manpads will be used for coverage for both Patriot and THAAD. Patriot will exchange automated track data over TADIL-J through the air battle management operations center (ABMOC), and EPLARS from SHORAD Sentinel sensors for early warning (digitized units only) against RW, FW and CMs. SHORADs primary role during defense design is to provide low-altitude protection for defended assets and to provide coverage to AAA, and to cover dead zones (backside) within Patriot and THAAD. SHORAD will also provide protection against FW, RW, CMs, and ASMs to Patriot and THAAD units. Coordination and integration must be done at all levels of air defense to ensure success on the battlefield.

## OPERATIONS

5-54. An AMDTF may be employed during any operational phase, including entry operations, shaping operations, decisive operations, or stability and support operations. The exact composition of the TF will depend upon METT-TC. For example, if the threat includes a mix of MRBMs and SRBMs, the TF will normally consist of a THAAD FU, several Patriot FUs, and a TF TOC. If the threat includes RW, FW, CM and or UAVs, SHORAD units may be included in the TF.

5-55. Regardless of the TF's composition or the phase of operations, TF operations must be integrated and coordinated to adequately counter the air and missile threat. Each element of the task force—the TF TOC, Patriot FU, THAAD FU, and SHORAD FU—contributes to countering the threat. Figure 5-8 presents an overview of TF operations, highlighting the contributions of each element of the TF. These contributions are described in more detail in the paragraphs that follow.

### Task Force TOC

5-56. The TF TOC is the focal point of task force operations. It has operational control and command over all units comprising the task force and is responsible for planning and coordinating task force defenses and operations.

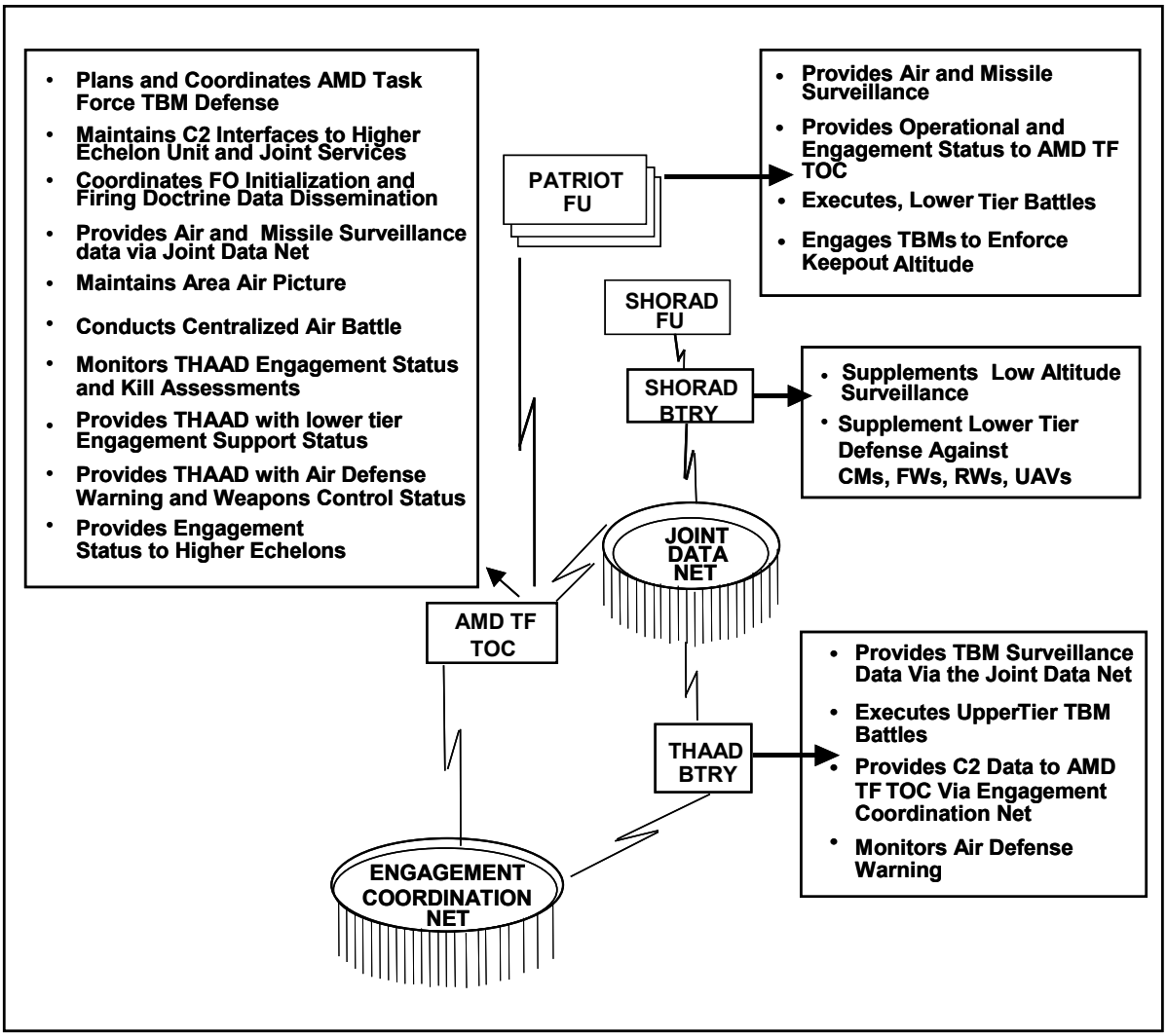



**Figure 5-8. Task Force Operations**

5-57. The TOC positions FUs to optimize the protection of selected assets in accordance with defense priorities. Patriot and SHORAD FUs may be employed in close proximity together to defend assets. Patriot's PTLs should be oriented toward suspected TBM launch sites and or the most likely AAAs to maximize detection and probability of kill. The THAAD PTL is normally oriented in the direction of threat TBMs, but THAAD has a much larger defended area, allowing for greater flexibility in employment and positioning with respect to defended assets.

5-58. During operations, the TOC receives air and missile surveillance data from lower-tier Patriot and SHORAD FUs, and ballistic missile surveillance data from the THAAD FU. THAAD and SHORAD tracks are sent over TADIL-J and then sent over the JDN to all users to include Patriot; it does not get retransmitted by Patriot. The TOC establishes and maintains a comprehensive picture of air and missile tracks for tactical operations.

5-59. The TOC coordinates the activities of all task force elements. This coordination includes correlating tracks, resolving identity conflicts, establishing engagement priorities, coordinating air engagements, monitoring TBM engagements, and distributing air defense warnings and WCSs. The TOC normally exercises centralized control of Patriot batteries in the air battle, but decentralizes execution of the TBM battle to the Patriot and THAAD FUs.

**Patriot FUs**

5-60. In most cases, THAAD provides the first line of defense against TBMs in the common target set. Patriot provides defense against lower-tier air and missile threats. Using organic sensors, they detect, classify, identify and track incoming threats and, if necessary, engage and destroy them. Aircraft engagements are performed under centralized control of the TF TOC to optimize fires and minimize fratricide.

5-61. TBM engagements are performed under decentralized control of the FU to ensure TBMs are engaged in sufficient time to enforce the minimum keep-out altitude. If collocated with the THAAD FU, Patriot FUs protect the THAAD against ARMs as well as CMs. Throughout the battle, Patriot FUs provide operational and engagement status to the TF TOC.

**THAAD FU**

5-62. The THAAD FU provides upper-tier defense against MRBMs and most SRBM threats. Using its organic sensor, it detects, classifies and tracks incoming ballistic missiles and provides this surveillance information to the TF TOC via the joint data network (JDN). THAAD operates in a decentralized engagement mode and then engages incoming ballistic missiles that threaten critical assets. During the battle, THAAD provides its operational and engagement status to the TF TOC via the joint mission management net (JMMN).

**THAAD-Patriot Engagement Coordination**

5-63. If incoming TBMs are capable of being engaged by both THAAD and Patriot, engagement coordination is required to optimize the use of interceptor resources as well as ensure the required level of protection. In coordinating the TBM battle, the TF TOC provides THAAD with an assessment of Patriot's capability to support THAAD engagements. If TBMs are eligible for THAAD-Patriot coordination, THAAD will send an engagement coordination message to the TOC via the JECN declaring whether or not lower-tier support is expected. In making an engagement decision, THAAD computes a method of fire for the engagement and determines if it has sufficient interceptor resources to execute the method of fire. THAAD informs the TOC that support is expected. However, THAAD does not automatically change method of fire based on the availability of Patriot support.

**SHORAD Units**

5-64. A SHORAD battalion and associated FUs may be utilized in the TF to supplement lower-tier defenses. These units include Avengers, Bradley Linebackers, and or Stinger teams. Using organic sensors (Sentinel radars) SHORAD units detect, track and engage very low-altitude threats, including CMs, FW and RW aircraft, and UAVs. This surveillance information is

passed to the SHORAD battery via SHORAD communications links, and then to the TF TOC via the JDN, where it is integrated with surveillance data for the Patriot FUs. SHORAD FUs execute FW, RW, CM, and UAV engagements in accordance with established ROEs and WCSs established by the AADC under decentralized control of the SHORAD battery (or TF TOC if a SHORAD battery is not present). Decentralized control increases the likelihood that a hostile aircraft will be engaged as soon as it comes within range.

### Task Force Communications

5-65. The TOC communicates with elements of the task force through several communication networks. These networks, described in detail in Appendix C, *Communications*, include the MSE net, the joint mission management net (JMMN), the joint data network (JDN) and the joint engagement coordination network (JECN).

- The MSE is a voice/data net used to coordinate force operations activities, including the dissemination of defense design information, firing doctrine, system initialization and sensor orientation to TF elements.
- The JMMN is a data net used to disseminate commands, engagement status and ICC/ECS operational status.
- The JDN is a data net used to disseminate near-real time engagement operations data, including air and missile track data.

## COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE

5-66. The ability of a Patriot unit to function effectively on the battlefield depends on effective $C^3I$. There are three types of Patriot $C^3I$ facilities, tactical operations center (TOC), command post (CP), and fire direction center (FDC).

### Tactical Operations Center

5-67. TOCs are located at all echelons which are authorized a staff. The battalion TOC is the operational control and planning center for the battalion. The TOC provides guidance to the subordinate unit commanders on employment, organization, and intelligence. In some situations, the TOC may be split into operations and logistics cells located in different areas. Normally, the S3 is in charge of the operations, planning, and intelligence cell. The administrative and logistics cell, under the direction of the battalion executive officer, handles administrative and personnel matters, and most logistics functions and coordination (see Chapter 6). Because the XO is second in command, additional duties and responsibilities may be assigned to him. The XO may advise the EMMO team to assist the admin/log cell on Patriot system logistic requirements.

### Command Post/Battery Command Post

5-68. Command posts (CP) are the command and control centers of the unit. The unit commanders are normally located at or near the CP. CPs are

maintained at both battery and battalion levels. CPs purpose within the battery is to maintain current situation awareness regarding the national alert status, the status of enemy and friendly forces, their own unit status and applicable orders in effect. They also control ground defense, battery Stinger teams, logistics functions, administrative communication networks, and other tactical unit operations.

5-69. The battery provides communications with higher, adjacent, and supporting units; to assist commander in planning, coordinating, and issuing of battery OPORDS. All CPs have secure communications to higher and lower elements. CPs must be able to execute current operations and to pass orders to subordinate ADA units simultaneously. CPs have dedicated elements to implement emergency survivability measures in case of chemical or ground attack. CPs can sustain operations indefinitely through crew rotation.

5-70. New technologies is now being integrated into the battery CP. The new Patriot battery CP provides shelterized communications, computer and display facilities as well as working space for the battery commander and his staff. This information will be seen using the AMDWS system. Personnel required to support battery CP operations will be 14Js. See Appendix B for the system descriptions. Some of the BCP functions will include the AMDWS functions and also the following—

- Provide recommendations or input during the planning.
- Receive and send required reports and SITREPS.
- Monitor the execution of operations.
- Maintain the current operations situation.
- Effectively manage logistics ensuring a continuity of combat consumables.
- Provide a focal point for the receipt and development of intelligence.
- Plan future operations.
- Provide situation information to higher headquarters.

### Fire Direction Center

5-71. The FDC is the air battle control facility for the Patriot battalion. It consists of the Patriot ICC and support equipment. Tactical directors and their assistants who operate the ICC control FDC operations at the tactical level. The unit tactical communication nets are routed through the ICC for air battle control. At the battery level, the ECS acts as the battery FDC, taking orders from the battalion FDC and disseminating needed information to the battery to accomplish the mission.

### Air Defense Command and Control

5-72. The three cornerstones that form the basis for AD $C^2$ are discussed in the following paragraphs. For a more complete discussion of $C^2$, see FM 44-100.

### Centralized Management and Decentralized Execution

5-73. Because of the complexity of force projection, air battle management must be centralized at the highest possible level to ensure synchronization of

effort and combat power. The sheer volume of operations precludes an efficient response at the highest air battle management level. The use of decentralized control would primarily be used against TBMs. Normally; SHORAD engagements are decentralized in order to increase the likelihood that hostile aircraft will be engaged as soon as it comes within the range of the weapon system. Execution at the lowest possible level ensures rapid and flexible response within the guidelines set by higher levels. Whenever friendly air forces maintain air superiority, Patriot units can expect the JFACC/AADC to exercise tight centralized control of Patriot firepower to prohibit fratricide.

**Air Battle Management**

5-74. Air battle management is the overlap between airspace control and air defense procedures. Close coordination is vital to the integrated AD activity due to the many systems and components involved. Mutual interference and fratricide must be prevented. There are two basic methods for air battle management. They are positive control and procedural control. Some combination of both methods is the most effective solution. The specific mix is determined by a number of factors. The nature and magnitude of enemy operations, and terrain and weather conditions will affect the balance of management. The availability, capability, reliability, and vulnerability of the management facilities, and the number, deployment and characteristics of friendly airborne weapon systems impact on the management method choice.

5-75. The electronic identification capabilities will determine the amount of positive management procedures used. The challenge for leaders of Patriot units is to understand how procedural control is implemented in their weapon system, and to be able to convert that understanding into permission to engage using procedural controls. As noted above, loss of air superiority, or failure to gain air superiority, will stress our ability to use positive control.

**Management by Exception**

5-76. This is the principle, which allows higher echelons to manage engagements even though authority is decentralized. Engagements could be overridden or directed. Rather than try to direct every engagement, air battle controllers will prevent prohibited engagements. This reduces the detail down to a manageable level at each level of control.

## TBM OPERATIONAL ENGAGEMENT EFFECTIVENESS

5-77. The operational engagement effectiveness is the overall level of "goodness" or "success" achieved in defending assets through an intercept or multiple intercepts following an established method of fire. This is achieved using the five levels of engagement effectiveness and seven integrated firing doctrine principles.

### PATRIOT AND THAAD THREAT SETS

5-78. Patriot operates as the lower-tier of a two-tier system and defends assets from short-range ballistic missiles (SRBMs). SRBMs are the primary TBM target sets for Patriot. The target sets for TBMs falls into Patriot only, THAAD only, and common threat sets for both THAAD and Patriot. The

following figure displays the TBM target sets for both Patriot and THAAD. These combinations are the fundamental building blocks used in developing a two-tiers TBM defense design.

5-79. The primary target sets for THAAD are SRBMs and medium range ballistic missiles (MRBMs). A THAAD battery provides the upper-tier of a two-tiers TBM defense and engages at long ranges and high altitudes.

5-80. In a two-tier defense, both Patriot and THAAD primarily perform active defense against short and medium range ballistic missiles. Patriot will provide defense against short-range TBMs as the lower-tier of a two-tier defense in conjunction with THAAD. THAAD will execute the upper-tier TBM battle to protect those assets assigned according to established priorities.

5-81. Within the common threat set for Patriot and THAAD, shown in Figure 5-9, there exists a set of TBMs that are engageable by both Patriot and THAAD. Using a two-tier defense, Patriot and THAAD may defend against this common threat.

- Common threat set assets may require two-tier defense.
- In a common threat set, both Patriot and THAAD can engage.
- A two-tier defense may be used against a majority of TBM threats.
- Two-tier defense provides significant flexibility in defense design and execution.
- Patriot or THAAD can engage to defend assets outside a common threat set using a one-tier defense.

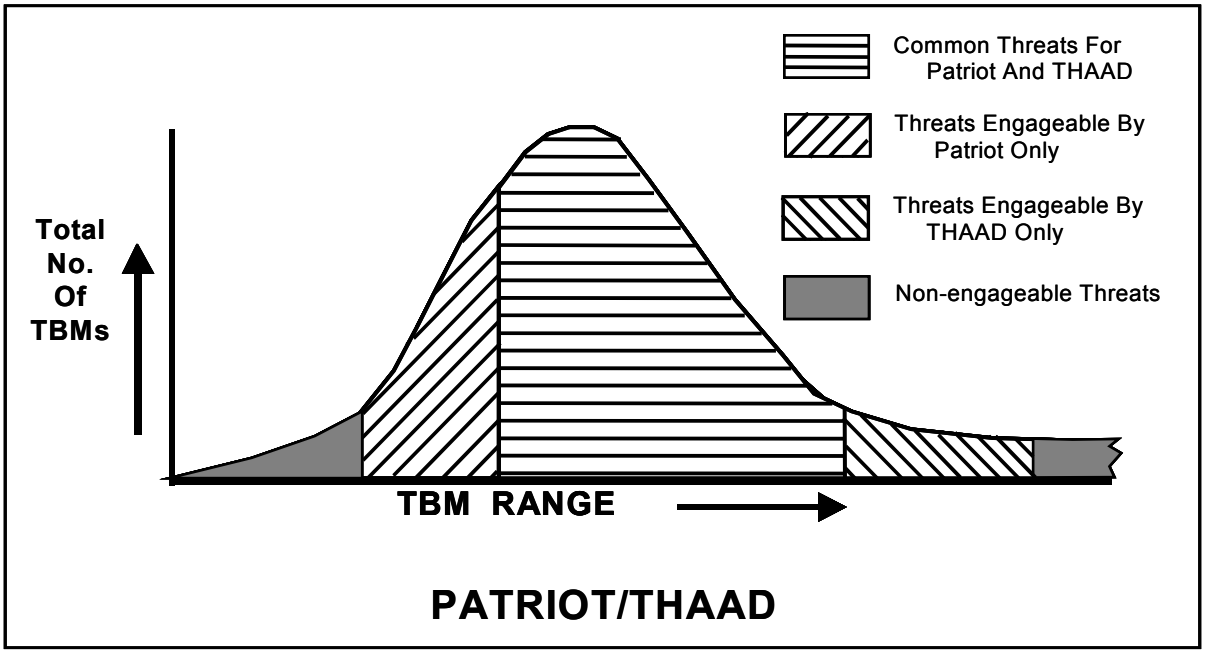



**Figure 5-9. Common Threat Set**

## LEVELS OF TBM OPERATIONAL ENGAGEMENT EFFECTIVENESS

5-82. The JFC normally establishes the required level of engagement effectiveness for each defended asset based on METT-TC. He specifies which critical assets on the defended asset list (DAL) will receive a level, ranging from Level 0 for no dedicated theater DCA, to Level 4 for a very high Level for high value assets (HVA). Each Level is defined by a specific percentage value and a corresponding number of shots. Once a level of engagement effectiveness is established, defense design and firing doctrine parameters are developed. The JFC-assigned levels of engagement effectiveness and available battlespace determine the method of fire (number of shots) used by the engaging fire unit.

5-83. The number of tiers does not determine the level of engagement effectiveness. For example, you could have two-tiers or one-tier of defense for Levels 1-4. However, one-tier normally handles Levels 1 and 2 while two-tiers normally handle Levels 3 and 4. Although a single-tier for Levels 1-4 is possible, it is not always practical. The key is how Patriot will achieve each level of operational engagement effectiveness, with or without upper-tier support. Patriot and THAAD TBM operational engagement effectiveness is based on the five levels as shown below in Figure 5-10. The specific percentage values for each level of engagement effectiveness are in FM 3-01.13.

| FIVE LEVELS OF TBM ENGAGEMENT EFFECTIVENESS |
|---|
| Level 0 = NONE − 0 Shots<br>Level 1 = LOW – 1 Shot<br>Level 2 = MEDIUM – 2 Shots<br>Level 3 = HIGH – 3 Shots<br>Level 4 = VERY HIGH – 4 Shots |
| Note: The number of shots taken may vary according to the SSEKP for each weapon system. Expected engagement effectiveness=$(1-(1-SSEKP)^{n})$ where **n** is the number of interceptors. |

**Figure 5-10. Levels of TBM Engagement Effectiveness**

- **Level 0 (none)** — the level of defense when no TBM active defense is provided. The JFC accepts maximum risk and active defense forces are not tasked to provide any TBM protection. Patriot will not fire.
- **Level 1 (low)** — the minimum level of TBM active defense that can be provided. JFCs may provide this level of protection throughout their operational areas, within smaller areas, or for specified assets. One-tier of TBM protection normally will be used. Patriot or THAAD will fire only one missile at a time using a shoot-look-shoot method of fire.
- **Level 2 (medium)** — the normal level of defense used to provide specified, hardened, or mobile military assets with a medium level of protection. Normally, using a single-tier of TBM protection is sufficient. Operating alone, Patriot will fire using a ripple or salvo method of fire depending on battlespace.

- **Level 3 (high)** — the appropriate level of defense for assets that require a more robust level of protection than Level 2 but less than a very high defense. Level 3 normally requires use of two-tiers but may use one-tier operating alone. This requires coordination between Patriot and upper-tier. Operating with two-tiers, THAAD may shoot one and coordinate with the lower-tier, Patriot will fire two missiles using a ripple or salvo method of fire. The exception is when THAAD shoots two and Patriot engages with a single shot.
- **Level 4 (very high)** — a near leak proof defense for high priority, vulnerable assets such as population centers, ports, airfields, logistics complexes, troop concentrations, and other assets. This level normally requires two-tiers operating together in an integrated defense. This requires coordination between Patriot and upper-tier to defend a common asset. Normally in a two-tier defense four missiles must be launched, two by THAAD and two by Patriot.

## INTEGRATED FIRING DOCTRINE PRINCIPLES

5-84. Complementing the five levels, there are seven integrated firing doctrine principles. These principles are designed to account for each possible scenario within the five levels of engagement effectiveness. They clarify the basis and rationale for the integration of THAAD and Patriot fires. The methods of fire and number of shots are derived from the application of these principles. There are two over arching principles; first, the right of self-defense is never denied, and second, the commander maintains the flexibility to tailor the defense in other than normal modes of operation.

- If the TBMs are threatening the fire unit, the TBM is determined to be a self-defense threat. The principle of "self-defense is never denied" is employed against TBM threats in a decentralized (automatic) mode of engagement.
- Integrated firing doctrine exceptions allow the JFC flexibility in tailoring the levels of defense in other than normal modes of operations.
  - The JFC may wish to provide some protection, Level 1 (low) asset protection, for selected assets within their defended areas. These assets are not sufficient priority to receive higher levels of protection. All assets or areas may receive some protection while maintaining higher levels of defense for other selected assets.
  - The FU provides a near leak proof Level 4 defense for selected assets against targets not in the common target set.
  - The FU provides a near leak proof Level 4 defense for certain assets protected by only a single-tier.

5-85. Principle 1—Ready/preferred missiles will not be held in reserve if they are needed for today's battle. Any TBM may be carrying weapons of mass destruction; therefore, Patriot and THAAD should engage a TBM threatening a defended asset with the best available interceptor for the mission. Engaging units should always shoot a TBM threatening a defended asset with the number of interceptors required to meet the CINC's engagement effectiveness guidance.

5-86. Principle 2—Defense designers should build defenses around Levels 2 and Level 4 criteria. Level 2 refers to the level of engagement effectiveness required against a specified target set that can be achieved from a single-tier operating alone. Level 2 is the appropriate level of defense for military assets that have some level of protection to similar less vulnerable assets. Figure 5-11 demonstrates Principle 2, Level 2 medium level of engagement effectiveness.

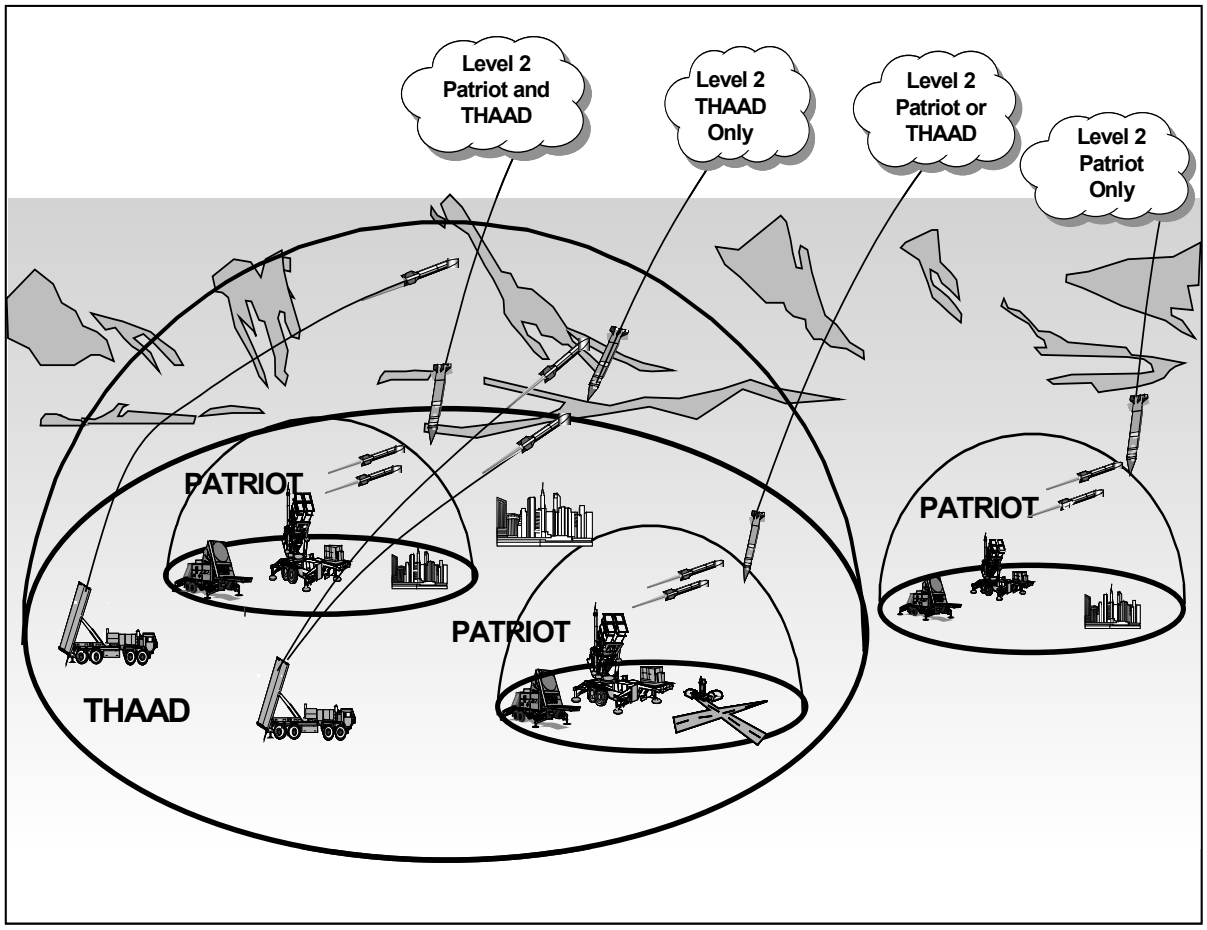



**Figure 5-11. Principle 2, Level 2, Medium Engagement Effectiveness**

5-87. Normally Level 4 refers to two-tiers operating in an integrated defense but may refer to one-tier operating independently. Two-tiers operating in an integrated defense is applicable only to targets in the common target set (upper and lower-tier). Figure 5-12 demonstrates Principle 2, Level 4 very high level of engagement effectiveness for two-tiers. Figure 5-13 demonstrates Principle 2, Level 4 for one-tier. Level 4 provides very high level of engagement effectiveness for soft targets and high priority assets such as population centers, ports and airfields.

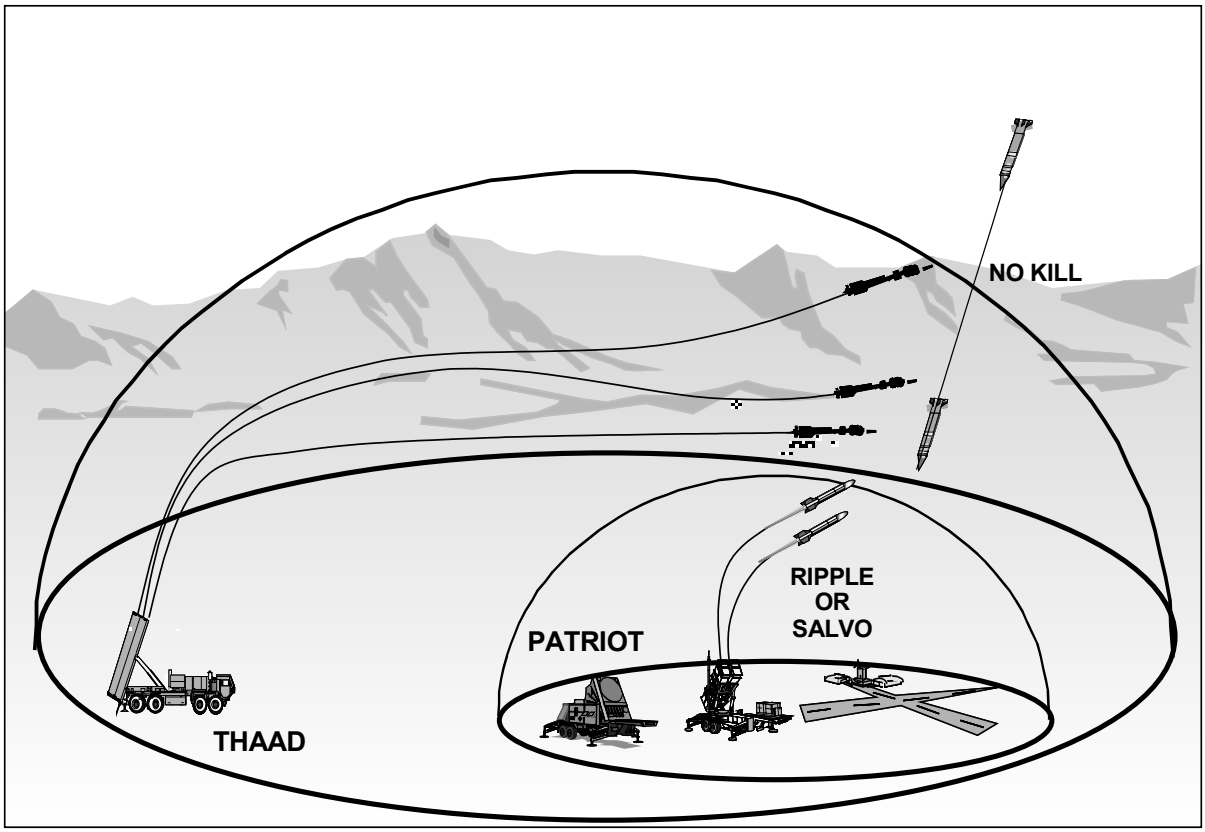



**Figure 5-12. Principle 2, Level 4, Two-Tiers Very High Engagement Effectiveness**

5-88. Fighting in an integrated two-tiers defense against TBMs will bring a new vision to how Patriot fights together with THAAD. First THAAD will fire one missile and look for a TBM kill, if no kill, the system will fire again as necessary to achieve the desired level of defense. In principle 2, when there is lower-tier Patriot support, THAAD will fire two more missiles while Patriot will engage with ripple or salvo method of fire.

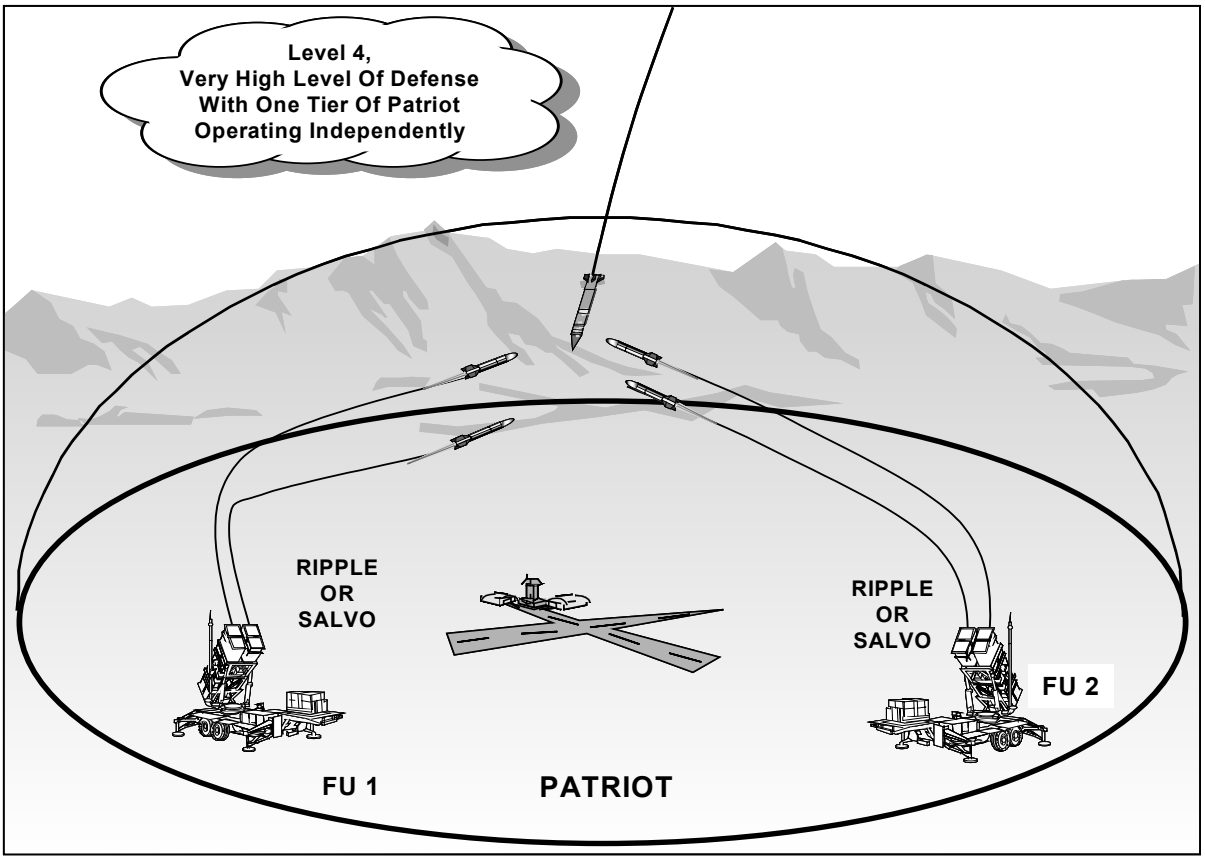



**Figure 5-13. Principle 2, Level 4, One-Tier Very High Engagement Effectiveness**

5-89. Principle 3—This principle states that there are four-upper/lower-tier combinations used for defense design. These four combinations are the fundamental building blocks in defense design. The combinations for this principle includes—

- Single-tier involving Patriot only.
- Single-tier with THAAD only.
- A two-tier THAAD (Any of these first three combinations will yield a Level 2 defense) or Patriot integrated defense.
- A two-tier THAAD and Patriot integrated defense. The fourth combination yields a two-tiers Level 3 (high) or Level 4 defense (very high) because both Patriot and THAAD can engage TBMs within the common threat set to defend the asset. This two-tiers defense provides significant flexibility in defense design and execution. The number of missiles fired by either tier may vary depending on battle space.

5-90. Any of these first three combinations in Principle 3 will yield a Level 2 defense. Within the two-tier defense, Patriot should not engage a TBM threatening one of its defended assets if THAAD has launched the right number of missiles to achieve the engagement effectiveness for a specified level of defense. Based on this knowledge, Patriot should not engage. There is no need for Patriot to fire.

5-91. Principle 4—Each tier in the defense must execute independently to attain engagement effectiveness Level 2 against its target set within battlespace constraints. In order to achieve Levels 3 and 4, normally Patriot and THAAD will operate in an integrated two-tiers defense (see Figure 5-12). To deliver the operational engagement effectiveness level, Patriot reacts to the knowledge of a hit or miss provided by THAAD. Even though THAAD is engaging targets, Patriot will conduct engagement according to the expected engagement effectiveness. In exceptional cases Patriot uses either two different launchers or two different batteries to achieve the required engagement effectiveness as a single-tier, see Figure 5-13.

5-92. Principle 5—Within its single-tier, battlespace Patriot will normally engage a TBM threatening its defended assets. Patriot supports only one engagement to enforce required keep-out altitudes for defended assets. If a NO KILL is assessed, the operational engagement effectiveness is ZERO. Figures 5-14 illustrates Principle 5, Level 2, Patriot enforcing keepout altitude.

- In a Level 1 defense, if a NO KILL is assessed, the operational engagement effectiveness is zero. Patriot will not have the battlespace to re-engage. If a NO KILL is assessed for THAAD, the operational engagement effectiveness is ZERO; the THAAD FU must fire again within the remaining battlespace to deliver the operational of engagement effectiveness.
- In a Level 2 defense, if a NO KILL is assessed by THAAD, and Patriot sees a surviving threat to a defended asset, Patriot has no operational alternatives except to engage. Patriot will engage to enforce the keepout altitude. If NO KILL is assed, then THAAD must fire two missiles to achieve Level 2. Patriot does not engage since THAAD has two missiles in flight to meet Level 2 requirements, see Figure 5-15.

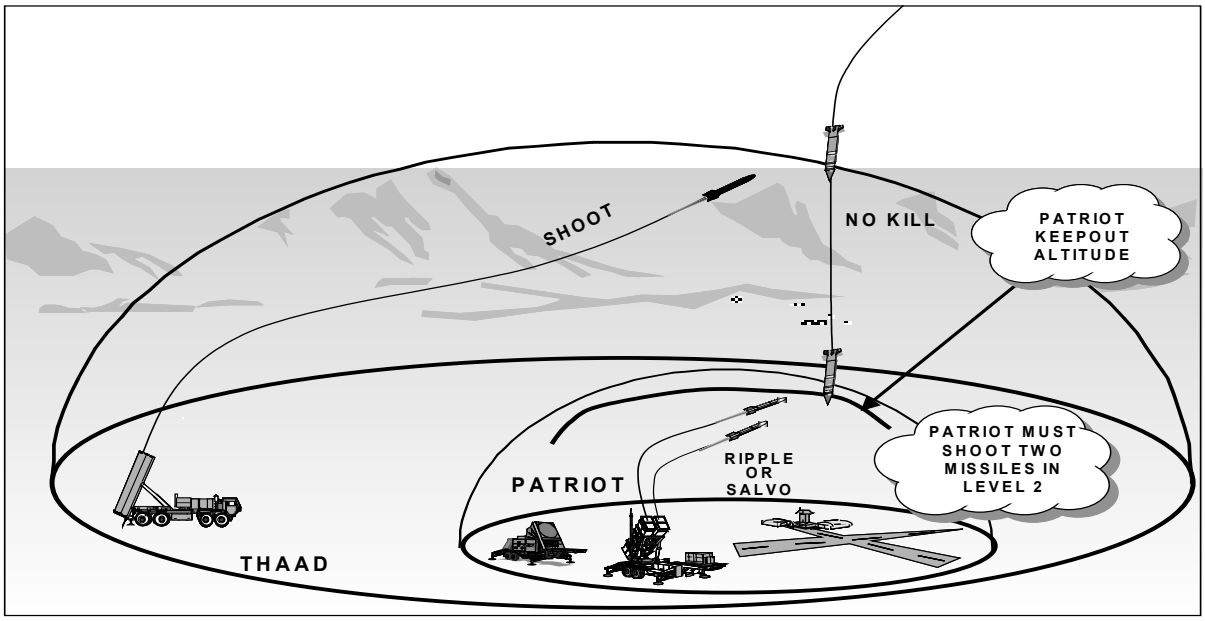


**Figure 5-14. Principle 5, Level 2, Patriot Enforcing the Keepout Altitude**

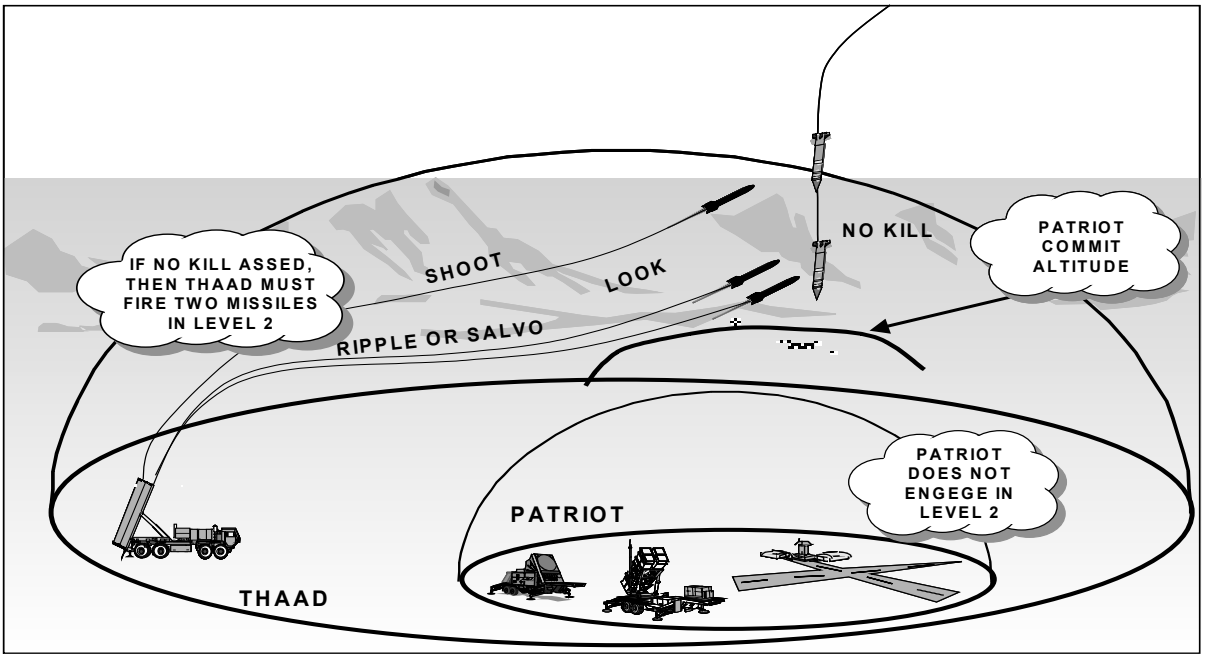



**Figure 5-15. Principle 5, Level 2, Patriot Does Not Engage**

5-93. Principle 6—In two-tier, THAAD and Patriot Levels 3 and 4 defenses, the upper-tier may commit its last shot to intercept below the lower-tier's commit altitude. Four missiles could be launched to intercept its target, although the likelihood of this occurrence is low. It is perceived as a necessary use of missiles in order to provide a high or very high defense. See Figure 5-16 for illustration of a Principle 6, Level 4 (very high) two-tier defense.

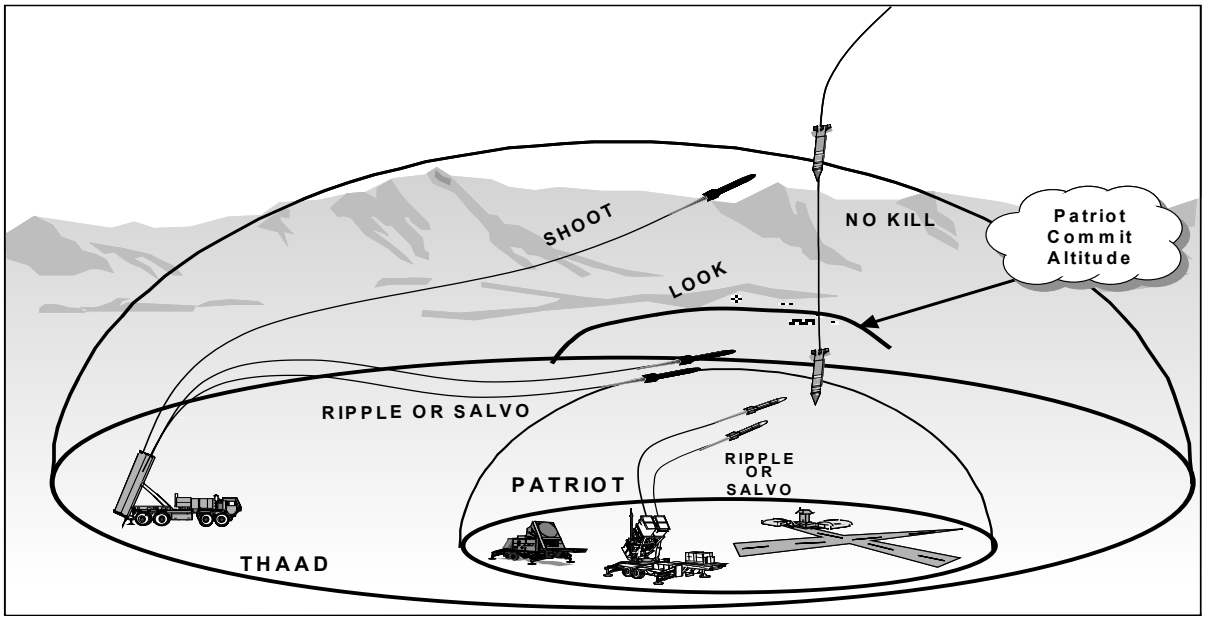


**Figure 5-16. Principle 6, Level 4, Two-tier Defense**

5-94. Principle 7—In a two-tier, THAAD or Patriot Level 2 defense, either tier may conduct the engagement of a specific threat. But, the upper-tier will not commit if the intercept kill assessment of the last shot will be below the lower-tier's commit altitude. Patriot contributes the last shots in an attempt to achieve Level 2. Figure 5-17 illustrates Principle 7, Level 2.

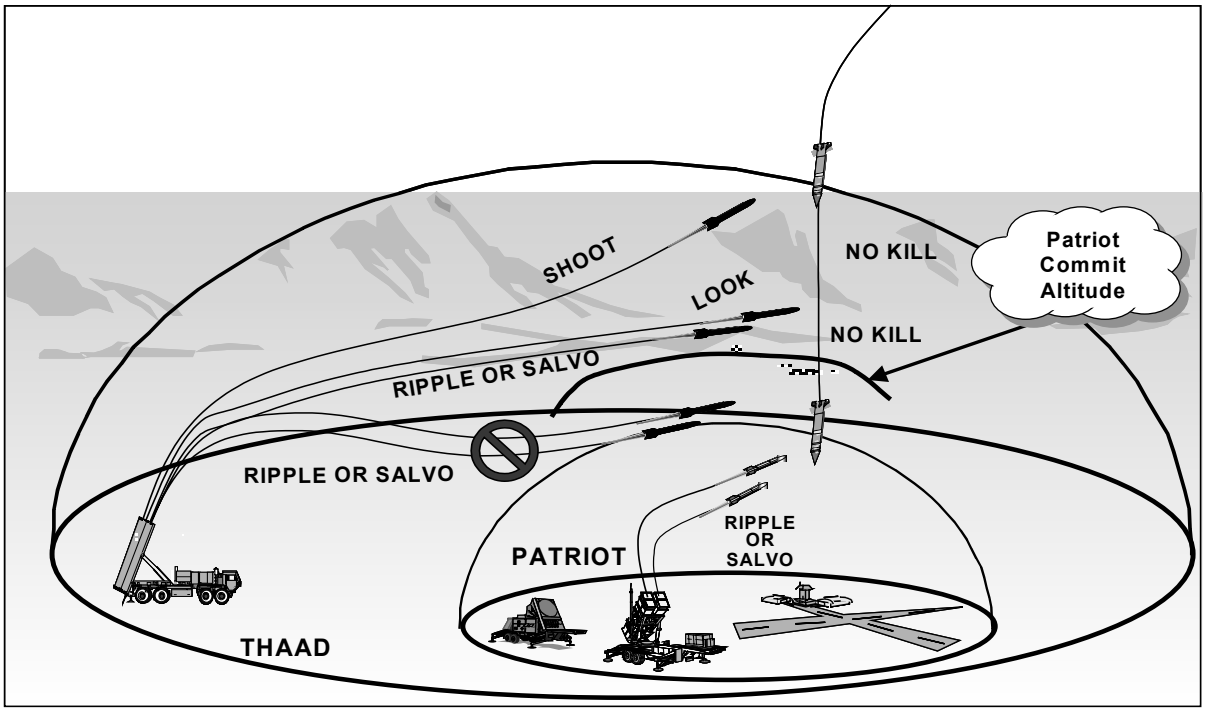



**Figure 5-17. Principle 7, Level 2, Two-tiers defense**

### Missile Conservation

5-95. The primary means of missile conservation within the constraints of the commander's guidance is a defense design consideration rather than a firing doctrine/method of fire consideration. Units must protect defended assets to the operational engagement effectiveness level specified until the JFC specifies new guidance, the threat is defeated, or all ready missiles are expended. Any TBM may carry weapons of mass destruction; therefore, Patriot and THAAD should engage a TBM threatening a defended asset with missiles which have the required lethality and using the method of fire needed to achieve the specified operational engagement effectiveness. Missiles should not be held in reserve.

## Chapter 6

# Patriot Combat Service Support

This chapter provides the doctrine for the combat service support (CSS) of Patriot battalions and batteries. It further discusses CSS provided by the corps support command (COSCOM) and the Theater Army Area Command (TAACOM) to provide an understanding of how they provide support to Patriot battalions assigned at corps or EAC.

To be successful, any concept of operation must be logistically supportable. The battalion commander and his staff must ensure that logistics is an integral part of the total battalion operation planning process. In determining the best COA, the commander must be fully aware of the logistic constraints and limitations, and adjust his COA, or accept the risks entailed by not doing so. Examples for the task organization resources and assets are included to ensure proper understanding, but are not the only method to support the mission. Comprehensive details on logistics are in FM 3-01.13, 54-30, 4-93.3, 4-93.4, 100-10 and 3-100.16.

## PATRIOT SUPPORT CONCEPT

6-1. The logistics concept for the Patriot battalion embodies the principles of responsiveness, flexibility, and initiative. Force-projection operations require that supporters anticipate needs and not wait and react to demands. Central to the ability to do this is constant coordination and detailed planning between supporters and those supported. Battery commanders, personnel officer (S1), and the battalion supply officer (S4) must understand the battalion commander's intent to perform responsively. Close coordination with the battalion S3 is necessary to ensure that batteries with the highest tactical priority receive required support first. Ammunition and bulk fuel resupply, direct support maintenance, personnel replacement, and medical evacuation are requirements with the highest priority depending on the tactical plan. FUs are not self-sustaining. External support is required from HHM, DS Maintenance Company and support systems in general.

6-2 The combat mission of the battalion and batteries remains the foremost consideration in carrying out logistics functions within the battalion. Resources and priorities are tailored to changing combat situations. Maintenance, supply, and other support elements are coordinated and positioned to be instantly responsive to the requirements of the battalion.

## ORGANIZATIONS AND FUNCTIONS

6-3. Patriot battalions should emphasize coordination with the ADA brigade, corps, and EAC units to capture all available resources. Commanders at all levels should designate a point of main effort along with supporting efforts. This helps them and their staffs to allocate resources accordingly.

Coordination with all levels is critical for overall success of the mission. Without the dissemination of information both to higher and lower, the battle cannot be won. Each unit and section has a specific function needed to provide logistics and support to the FUs. An effective fighting force requires teamwork and cohesion to ensure success on and off the battlefield.

## ADA BRIGADE

6-4. Discussion about the ADA brigade is included to facilitate adequate understanding of the support operations conducted at corps and EAC level. The ADA brigade, whether assigned at corps or EAC, concentrates on centralized logistics staff planning to interface with corps and EAC materiel management centers (MMCs).

6-5. At the corps level, the ADA brigade receives support from the COSCOM corps support battalion (CSB) assigned to the corps support group (CSG). In some cases, support may come from the division support command's (DISCOM) forward support battalions (FSBs) and main support battalions (MSBs). With the proper coordination, divisional support units can support Patriot units but will require augmentation from elements of the corps support battalion. Units in the DISCOM can provide general supplies, but do not have the capability to provide adequate maintenance support peculiar to the Patriot system. To draw logistics support from corps support elements through MMCs, the ADA brigade has to centralize its requirements. The central logistics staff planning and visibility function can be accomplished by a logistics readiness center that has responsibility for planning supply, maintenance, transportation, services, and support operations functions. The brigade S4 section interfaces with the corps MMC or their supporting operations section at the corps support group or corps support battalion level. The relationship is METT-TC driven, but it should be pointed out that direct coordination with the corps MMC is not always the case.

6-6. At the EAC level, the ADA brigade receives logistics support from the appropriate functional battalion assigned to the TAACOM's area support groups (ASGs). In some cases, EAC ADA brigade elements operating within corps forward areas receive their support as described above. Because of the large area of operations for an EAC ADA brigade and the wide dispersion of the support elements, the EAC brigade must be aggressive in task-organizing available logistics personnel and assets to provide continuous support.

## PATRIOT BATTALION

6-7. The Patriot battalion commander provides logistics support for his organic elements and for any attached elements. Logistics support received through the ADA battalion encompasses those support activities required to sustain campaigns and major operations.

### Organization

6-8. Patriot battalion support is provided by the organic supply and maintenance support element of the battalion. It normally deals with Classes I, II, III (package), IV, V, VII, and IX. The batteries coordinate through the

battalion to draw or receive support. Higher echelons provide combat elements with food, fuel, ammunition (both conventional and missile), GS maintenance, and medical support when required. The battalion S4 coordinates logistics support for assigned or attached Patriot batteries.

**S4 Responsibilities**

6-9. The battalion S4 along with all other staff must thoroughly understand the battalion mission. To provide positive and responsive support to each element of the supported force, he must determine the needs of each supported element, when and where it will be done, and how it will be accomplished. The type, quantity, and priority of required logistics support must be understood and defined.

**Materiel Supported**

6-10. Anticipation and planning are very important for supply Classes II, III, IV, V, VII, and IX and materiel maintenance because all these items and actions are sensitive to variations in weather, terrain, and the tactical situation. Class III and Class V are both particularly sensitive to variations in intensity of combat. Before any type of operation, direct coordination between the S3 and the S4 in both of these areas is required to determine support requirements. Materiel densities in each support area within the battalion must be established so risks may be assessed, proper operational decisions made and adequate supply and maintenance resources allocated to meet support requirements. For Class VIII, medical materiel requirements are based upon medical materiel densities and the level of patient support activity. The environment affects water supply.

**Logistic Assets and Functions**

6-11. The battalion executive officer is the commander's assistant and also second in command responsible for directing, coordinating, supervising, and training the staff, He is the manager of all administrative and logistical functions within the battalion. In addition, he is normally responsible for coordinating maintenance and reconstitution efforts. As such, he should organize and take advantage of all assets available. Some materiel readiness functions the XO must coordinate throughout the battalion are–

- Apprising the commander of materiel readiness.
- Cross leveling within the battalion for required repair parts.
- Providing assistance to subordinate units on materiel readiness problems.
- Providing liaison with higher headquarters and outside agencies regarding materiel readiness.

6-12. The XO and the logistics personnel are normally located with the battalion TOC or trains during combat operations. The XO is responsible for the supervising of all tasks assigned to the staff officers. The staff officers continuously provide information and recommendations to the XO on the progress of the battle and related events, which in turn provides the commander with needed information that allows the big picture to be seen.

### S1 Responsibilities

6-13. The personnel officer (S1) prepares the personnel estimate, and assists the S4 with preparation of the support annex to the OPORD. The focus during planning must be on maintenance of unit strength and soldier readiness. The S1 is the primary administrative officer. He is responsible for administrative functions within the battalion such as strength accounting, forecasting personnel requirements, replacement operations, and casualty operations. The S1 is also responsible for mail. He is normally located wherever the battalion TOC is during combat operations. The S1 also has primary staff responsibility for enemy prisoner of war (EPW) operations and medical planning. He coordinates with the S2 for interrogation of prisoners and with the S4 for processing captured equipment and for transportation requirements. The S1 coordinates with the battalion surgeon to ensure that patient treatment and evacuation are planned and coordinated throughout the battalion. Personnel support operations maintain unit strength and provide special services to the individual soldier. Personnel support includes but is not limited to—

- Personnel services.
- Chaplain activities.
- Administrative services.
- Legal services.
- Health services.
- Comptroller and finance services.
- Morale and welfare support services.
- Personnel automatic data processing support and services.
- Public affairs.

6-14. The S1 section provides personnel, legal, finance actions, and other general administrative services for the battalion. If the battalion chooses to echelon its trains into combat trains and field trains, the S1 section has personnel at both locations. The S1 and his staff, in the combat train's command post (CP), primarily perform the critical tasks of strength accounting and forecasting, as well as CP functions. S1 personnel in the field trains perform the critical task of casualty reporting, as well as replacement operations, administrative services, personnel actions, legal services, and finance services.

6-15. The S1 plans and coordinates EPW operations, collection points, and evacuation procedures. EPWs are evacuated from the battalion area as rapidly as possible. The capturing battery is responsible for guarding EPWs until relieved by proper authority, recovering weapons and equipment, removing documents with intelligence value, and reporting to the field and combat trains CPs. EPWs may be evacuated to the vicinity of the combat trains for processing and initial interrogation.

6-16. The battalion surgeon operates the battalion aid station. He also coordinates the operations, administration, and logistics of the medical section. This includes coordinating patient evacuation to the supporting medical company and providing support to batteries.

6-17. The medical section sorts, treats, and evacuates casualties or returns them to duty. It carries a basic load of supplies for medical section operations. It is also responsible for maintaining and evacuating battalion medical equipment.

6-18. The chaplain supports the S1 as the morale officer. He conducts religious services, personal and religious counseling, and pastoral care. He may also be asked to provide religious support to the community to include confined or hospitalized personnel, EPWs, civilian detainees, and refugees.

6-19. The S4 is the logistics officer for the battalion, and is responsible for supply, maintenance, services, and transportation of unit personnel and equipment. He forecasts logistical requirements and supports requests from subordinate units. During combat, the S4 concentrates on seven classes of supply: Classes I (subsistence items), II (general supplies and equipment), III (POLs), IV (engineer supplies), V (ammunition), VII (major end items), and IX (repair parts and components). The S4 and headquarters and headquarters battery (HHB) commander coordinate the requisition, receipt, preparation, and delivery of Classes I, III, and V. The S4 is supported by the battalion maintenance officer (BMO) located in the motors section, the food service noncommissioned officer (NCO), and the S4 section (which includes a missile reload section).

6-20. The S4 section is responsible for supply, transportation, and field service functions. The section coordinates requisition and distribution of supplies to battery supply sections and turns in captured supplies and equipment as directed. If the battalion chooses to subdivide its trains into combat trains and field trains, the S4 section has personnel at both locations. They are cross-trained with personnel from the S1 section in critical tasks to permit continuous operations. The supply section coordinates the requisition, receipt, and delivery of Classes II, IV, V, VII, and IX.

6-21. The signal officer is the principal staff officer for all matters concerning signal operations, automation management, network management, and information security. The areas of responsibility may include but are not limited to— managing radio frequencies, managing communication protocols and security, and coordinating the configuration of local area networks that support the force.

6-22. The battalion maintenance officer (BMO) monitors and supervises motor maintenance activities within the battalion. He advises the battalion XO on vehicle repair, conventional maintenance, and recovery operations during peacetime operations. However, in wartime he supports the S4. He monitors the status of the battery motor pools and coordinates with the combat support company (CSC) on priority of repair.

6-23. The electronic missile maintenance officer evaluates, supervises, and monitors Patriot missile maintenance operations throughout the battalion. He advises the battalion XO and the S3 and S4 on Patriot unit system outages, system capabilities, and status. He also assists battery warrant officers with maintenance programs and coordinates with the direct support (DS) unit on repair priority.

### Task Force Operations

6-24. Task force (TF) operations with THAAD add additional planning and sustaining operations. When a THAAD battery joins the battalion and a TF is created, the attachment should bring an appropriate "slice" of CSS assets from its parent unit. Likewise, when a Patriot "slice" joins a TF, the TF S4 integrates these assets. The attached unit leader must coordinate with the TF S1 and furnish a copy of his unit battle roster. Thereafter, the attached unit submits reports and requests resupply according to the TF SOP. Everyone involved must understand his responsibilities and those of the CSS organizations.

## PATRIOT BATTERY

6-25. The fire unit is the lowest tactical organizational unit with personnel designated by the modified table of organization and equipment (MTOE) to perform logistics functions. Battery elements perform unit-level maintenance and supervise unit supply operations. It is at the battery level that supplies requests, personnel status reports, and other requirements for logistics support originate.

### Battery Headquarters

6-26. The Patriot firing battery headquarters has a command element, supply element, food service element, maintenance, and security section (when augmented). The first sergeant is the one who usually controls the unit trains consisting of mess teams, supply section, and medics.

### Battery Elements

6-27. The battery commander has overall responsibility for logistics in the battery. During combat operations, the battery XO, first sergeant, motor sergeant and battery warrant officer assist in the supervision and execution of logistics operations.

6-28. The battery XO is the logistics coordinator. During preparation for the operation, he coordinates closely with the first sergeant, the conventional motor maintenance officer, and the Patriot missile system technician to determine what is required and makes sure arrangements have been made to support the tactical plan. Besides his tactical requirements, he manages and monitors the battery's logistics operations. The XO also receives periodic maintenance updates from platoon leaders, platoon sergeants, the first sergeant, and warrant officers.

6-29. The motor sergeant supports the battery maintenance officer and ensures all maintenance procedures are properly followed. Other section supervisors will also ensure that proper organizational maintenance is performed on equipment assigned to their respective sections. The motor sergeant organizes and supervises motor maintenance and advises the XO and first sergeant on vehicle recovery, repair, and destruction. He directs the motor maintenance and ensures requests for repair parts are prepared and forwarded to the direct support unit. This NCO distributes repair parts when they are received and supervises exchange and cannibalization when

authority is delegated to him. He coordinates with platoon sergeants for maintenance status of the platoons. POL handlers fall under control of the motor sergeant, all requests and waste products are turned into the motor NCO for approval

6-30. The Patriot missile systems technicians are extremely important logistics members of the Patriot battery. They are the Patriot system experts. They are responsible for maintaining all Patriot equipment assigned to the battery according to the maintenance SOP. These officers, using the unit-level logistics system (ULLS), control the Patriot prescribed load list (PLL), and the usage of Patriot peculiar repair parts. They advise the platoon leaders and battery commander on Patriot system capabilities, limitations, and equipment status. They coordinate among battery officers to ensure Patriot peculiar parts and supplies are available for maintaining a mission-capable posture. They direct the actions of Patriot system maintenance personnel and ensure Patriot equipment outages, work orders, and requisitions for repair are initiated and recorded. Patriot warrant officers ensure Patriot equipment status reports are forwarded to the battalion per SOP. The systems maintenance officer is normally located in the battery maintenance group during combat operations, but may be located with the battery CP as necessary for coordination of missile maintenance and logistics actions.

6-31. The first sergeant is the battery's primary CSS operator. He executes the battery logistical plan, relying heavily on the battery and battalion SOP. The first sergeant directly supervises and controls the battery trains. He receives CSS reports from the platoon sergeants, provides information to the XO, helps the XO complete CSS preparations, and plans and conducts CSS operations. He also receives, consolidates, and forwards all administrative, personnel, and casualty reports to the battalion trains. He directs the medical evacuation team forward when the situation requires. He orients new personnel to the battery and assigns replacements to the platoons. The first sergeant supervises the evacuation of casualties, EPWs, and damaged equipment. Additionally, he maintains the battle roster for the battery.

6-32. The motor section personnel, using the ULLS, maintain the unit's conventional PLL. Standardized combat PLL items set forth in the mandatory parts list for the unit's TOE must be stocked in the PLL. Other items may be stocked, based upon demands and availability of funds. Arms room equipment, NBC equipment, and dining facility equipment must be considered when designing a unit's PLL.

6-33. The supply sergeant is the battery's representative to the battalion CSS elements. He submits requests for issue and turn-in of Class II, IV, VII, VIII (first aid and combat lifesaver supplies only), and IX items. The supply sergeant coordinates with the battalion S4 for Class I, III, and V supplies. He maintains individual supply and clothing records and picks up personnel replacements at the battalion and or task force trains, and prepares them for the first sergeant. He also receives and evacuates personnel killed in action (KIA) to the mortuary affairs collection point in the support area.

6-34. The supply personnel maintain the battery commander's hand receipts, as well as run other supply room functions. It is the supply sergeant's job to

maintain the subhand receipts, as well as the component listings. Supply is responsible for ordering supplies for the unit.

6-35. The supervisors assigned to the various sections in the unit are responsible to ensure that all supply procedures are properly followed. It is the section sergeant's responsibility to ensure that all of the equipment under his control is properly accounted for and sub-hand-receipted down to the lowest level possible.

### Combat Support Company (DS)

6-36. This company provides maintenance support to HHB and up to 6 Patriot batteries through the battalion (6 batteries is based on location of theater). It repairs automotive, communications, communications security (COMSEC), construction, power generation, small arms, quartermaster, chemical, and utilities equipment. It performs metal-working functions and repairs special electronic devices and tactical microwave systems. The company also conducts 120-day and longer interval preventive maintenance checks and services. For nonsystem equipment, the DS company provides the following support to the Patriot battalion and battery:

- The technical supply section manages the flow of repair parts. This section stocks and dispenses repair parts used by the supported units.
- The augmentation team provides DS and general support (GS) maintenance for the Patriot missile system at EAC or corps. This support includes limited base shop and two maintenance support teams (MSTs) for Patriot peculiar equipment, limited Class IX (base shop and MST) support.
- The conventional maintenance platoon provides automotive, communications, COMSEC, power, and air-conditioning repairs for the Patriot battalion.

## PLANNING

6-37. Logistics planning ensures support during all phases of an operation. The plan is developed concurrently with the tactical plan. Supporting plans are as detailed as planning time permits. Using SOPs and planning for contingencies will greatly assist the logistics staff officers in the planning efforts. Task force orders only address deviations from the routine planning priorities established in the SOP.

### PRINCIPLES

6-38. Successful operations depend on three basic principles. These principles must direct the logistics effort as follows:

- Logistics functions are anticipatory in nature and are performed as far forward as the tactical situation permits. Support must be continuous, using immediately available assets. Ammunition, fuels, parts, end items, maintenance personnel, and replacements are

"pushed" forward to the combat trains, unit maintenance collection point (if established), and logistical release points (LRPs).

- Logistics planning is a continuous function. Coordination among tactical planners and logistics planners is essential and addresses all factors that can greatly affect the tactical mission.
- Staff officers and commanders must act rather than react to support requirements. Personal involvement, remaining abreast of the tactical situation and on-the-scene appraisal of the situation are critical to mission accomplishment.

### SUPPORT OF COMBAT OPERATIONS

6-39. Logistical planning begins when the unit starts to formulate a tactical plan. The XO and the S4 must participate in developing the logistics annex to the tactical plan. The planning process begins when the battalion commander provides mission guidance to the staff. The XO and other staff follow the planning process outlined in FM 101-5. The logistics estimate is an analysis of logistics factors affecting mission accomplishment. Logistics planners use these estimates to recommend COAs and to develop plans to support selected concepts of operation. The key concerns of ADA battalion logistics planners are the status of supply Classes III, V, and IX, and the operational status of ADA equipment, generators, and associated vehicles. To ensure effective support, logistics planners must understand the commander's tactical plans and intent. They must know–

- What each of the supported elements will be doing.
- When they will do it.
- How they will do it.

6-40. After analyzing the concept of operations, logistics planners must be able to accurately predict support requirements. They determine–

- What type of support is required.
- What quantities of support are required.
- The priority of support, by type and unit.
- Capabilities and shortfalls of support that is required.
- Analysis and solutions for shortfalls/situations.

## OPERATIONS

6-41. Patriot battalion and battery commanders can ensure flexibility by tailoring organizations and methods. They should not allow themselves or their organizations to be bound by traditional support methods. Logistics planners, for their part, must accept deviation from plans as routine. They must use initiative to carry out their responsibilities, know the CSS requirements of their forces and the details of operational plans, and devise innovative ways to support the plan and reduce the risks.

6-42. The battalion's combat mission must remain the first consideration in the task organization. Resources and priorities must be adapted to changing combat situations. Assets must be flexible enough to support from any base arrangement and still be able to survive and accomplish their mission.

Maintenance, supply, and other support elements must be instantly responsive to the requirements of the unit. All of this means continual and direct coordination between operations planners (battalion S3).

6-43. In coordination with the battalion S3, the S4 must establish priorities for support. Ammunition and bulk fuel resupply, DS maintenance, personnel replacement, and medical evacuation may all have high priority, depending on the tactical plan. Effective communications must be maintained between the Patriot battalion staff and the staff of the ADA brigade to determine the support requirements of the battalion and to coordinate support activities.

6-44. Close coordination is also necessary to ensure that units with the highest tactical priority receive their required support first. Effective communications and coordination enable support elements to emphasize the flow of supplies rather than the buildup of stocks. It may be necessary to stock critical supplies near points of anticipated consumption to permit continued operations in the event of disruptions in the supply system. However, such actions must not impede battery mobility. It may be necessary for the support elements to shuttle many of the required supplies. Constant and complete coordination is also necessary to ensure effective and integrated transportation support in constantly changing circumstances.

## POSITIONING CONSIDERATIONS

6-45. Built-up areas are good locations for trains. They provide cover and concealment for vehicles and shelter that enhance light discipline during maintenance. When built-up areas are used, trains elements should occupy buildings near the edge of the area to preclude being trapped in the center.

6-46. The following factors govern the positioning of the battalion trains:

- Room for dispersion.
- Amount of cover and concealment from both air and ground observation.
- Ground that supports vehicle traffic.
- A nearby helicopter landing site.
- Routes to LRPs or to battery positions.
- Unrestricted movement in and out of the area.
- Intensity of enemy activity in the area.
- Whether the type of operation underway is offensive or defensive.
- Trains security.

6-47. Elements behind the FLOT form base clusters and must be prepared to defend themselves against guerrillas, special operations type forces, and forces that have broken through or bypassed the defense. Responsibility for train's security should be delineated in the unit SOP. In all trains areas, a perimeter defense is normally planned. Elements in the trains are assigned a specific sector to defend. Mutually supporting positions that dominate likely AAs are selected for vehicles armed with heavy machine guns. Reaction forces and observation posts (OPs) are established, based on the unit SOP. To enhance security, an alarm or warning system is arranged. Sector sketches, fire plans, and obstacle plans should be prepared. Rehearsals are conducted

to ensure that all personnel know the part they play in the defensive scheme. The OIC establishes a shift schedule for operations and security on a 24-hour basis. The schedule is determined based on the number of personnel, amount of area to be covered, type of security needed.

### COMMAND AND CONTROL

6-48. Logistics $C^2$ in the Patriot battalion is defined as the system used to control and direct activities to support accomplishment of the mission. The essential elements are an established hierarchy of control centers, continuous communications between those control centers, and a responsive logistics control element (S4, battalion XO, and battery executive officer), and supervision of the execution of the logistics support plan.

### COMMUNICATIONS

6-49. Patriot battalion logistics support has the internal UHF network as its primary communications see Figure 6-1 for breakdown. FM/AM systems net serve as the alternate communications means. For lengthy reports, use messenger, wire, or mobile subscriber equipment (MSE) communications.

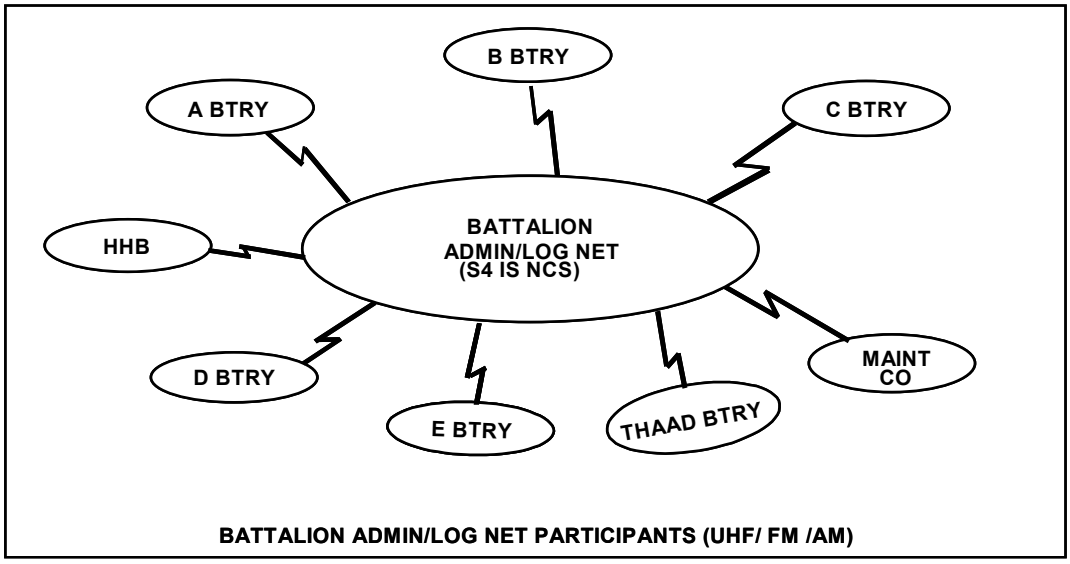



**Figure 6-1. ADA Logistics Net**

## SUPPLY

6-50. EAC and corps customer's request supplies from the supply point assigned to support them. Classes II, III, IV, and VII, and DS water support are provided to ADA units by the supply company (DS) respectively assigned or attached to the CSG or ASG battalions in the COSCOM and TAACOM to provide area support. ADA units submit requests for these classes of supply to the designated supply company's direct support unit (DSU), which either fills the request or passes the requisition to the corps materiel management center (CMMC) or the TAACOM MMC for action. Most requirements for Class VII items are submitted by units to the proper S4 property book officer

and or section, which then submit requisitions to the DSU. Class V and IX support is provided by the designated COSCOM and TAACOM operated ammunition supply point (ASP), and the nondivisional maintenance company, respectively. All DSUs provide supply point distribution on an area or task basis.

6-51. The corps or TAACOM MMC may direct issue from another DSU to the customer, or direct issue from corps and or theater GS stocks to the servicing DSU, which then issues to the customer. While issue from the supply point is considered the normal method of distribution, the MMC can order direct unit distribution. This would consist of delivery of the requisitioned items from the designated DS or GS supply source directly to the supported ADA unit customer, using corps or theater army transportation assets. Coordination with the battery or battalion for missile reload depends on the tactical situation.

6-52. The battalion always maintains some combat-essential supplies and repair parts. These are called combat loads, basic loads, and PLLs. The minimum stockage level is normally directed by brigade or higher. The purpose of these loads is to enable a unit to sustain itself in combat for a limited period, should there be an interruption in the resupply system. This period normally is 15 days for general supplies and repair parts, and 3 to 5 days for Classes I, III, and V.

## CATEGORIES OF SUPPLIES

6-53. There are three categories of supplies, with regard to how supplies are requested and issued. These are discussed in the following paragraphs.

### SCHEDULED SUPPLIES

6-54. Scheduled supplies are those for which requirements can be reasonably predicted or have a recurring demand. Normally, a scheduled supply does not require submission of requisitions by users for its replenishment. Requirements are based, for the most part; on troop strength, equipment density, forecasts, and or daily usage factors. Scheduled supplies are normally shipped to users based on pre-planned distribution schemes.

- Classes I, III (bulk), V, and VI are normally treated as scheduled supplies.
- Class II and VI (general supplies and equipment, and personal demand items) requirements are based on troop strength.
- Class III (bulk POL) requirements are based on long-range forecasts, equipment densities, and historic usage factors (experience).
- Class V (ammunition) requirements are based on densities of weapons and nature of mission(s).

### DEMANDED SUPPLIES

6-55. Demanded supplies are those for which a requisition must be submitted. This is for expendable items such as nuts and bolts, tools, or items

that have a recurring demand. Items in supply Classes I, III (packaged), VI, VII, and IX are considered demanded supplies.

### REGULATED SUPPLIES

6-56. Regulated supplies can be scheduled or demanded, but the commander must closely control these supplies because of scarcity, high cost, or mission need. Any item or group of items can be designated as regulated. Normally, some items in supply Classes II, III bulk, IV, V, and VII are regulated. If an item is regulated, the commander who designates it must approve its release prior to issue. Items designated as command regulated are identified in operation plans (OPLANs) and OPORDs for operations that occur during the time in which the items are regulated.

### DISTRIBUTION METHODS

6-57. The battalion uses two distribution methods to replenish its stocks, supply point and unit. Established requisition channels are used, regardless of the issue method chosen by higher headquarters. The S4 section is organized to process supply requests and to receive, issue, and temporarily store supplies. The commander, based on recommendations by the S4 and the operational requirements of the battalion for items in short supply, determines distribution priorities.

### SUPPLY POINT DISTRIBUTION

6-58. The battalion, using organic transportation, goes to the supply point to pick up supplies. This is the normal method used. The battalion supply system is designed to operate self-sufficiently.

### UNIT DISTRIBUTION

6-59. Supplies are delivered to the battalion by transportation assets other than its own. The battalion uses unit distribution to resupply its subordinate elements. When feasible, supplies are shipped directly from the issuing agency as far forward as possible, if the receiving unit has the material-handling equipment necessary to handle the shipping containers. This means that some supplies may be issued directly to the battalion from COSCOM or even theater army level, especially Classes III and VII. This issue usually occurs no farther forward than the field trains.

## CLASSES OF SUPPLY

6-60. Supplies are grouped into 10 classes (Classes I through X) and miscellaneous supplies. These classes are described below.

### CLASS I--SUBSISTENCE ITEMS

6-61. In the initial states of combat, rations are pushed through the system based on strength reports. Water is not a Class I supply item, but is normally delivered with Class I. Water supply points are established as far forward as

possible. Water for the battalion and or battery is picked up in water trailers from area water points which, whenever possible, is collocated with the Class I supply point.

## CLASS II--GENERAL SUPPLIES AND EQUIPMENT

6-62. Battalion and battery requirements for Class II supplies (other than principal items) are submitted to the supporting COSCOM or TAACOM supply company (DS). The DSU then fills the requirement from its supply point inventory, or passes the requisitions to the CMMC or the TAACOM MMC for action.

## CLASS III--PETROLEUM, OILS, AND LUBRICANTS

6-63. POL consists of petroleum fuels, hydraulic and insulating oils, chemical products, antifreeze compounds, compressed gases, and coal. Unit requirements for Class III packaged materials are submitted to the supporting COSCOM or TAACOM supply command (DS). The DSU fills requisitions from its supply point inventory or passes the requisition to the CMMC or the TAACOM MMC for action. A dedicated supply system manages, transports in special containers, and issues the supply of bulk petroleum products. POL is obtained by the battalion or battery using organic bulk POL assets from the designated Class III supply point established by the supply company (DS). A formal request is not needed to obtain bulk fuel at a supply point. Requests from batteries to the battalion are not required for bulk POL resupply. POL carriers move forward with each logistics package (LOGPAC) to the batteries as needed.

## CLASS IV--ENGINEER SUPPLIES

6-64. This class includes construction and barrier materials: lumber, sandbags, and barbed wire. Class IV supplies are requisitioned in the same manner as Class II.

## CLASS V--AMMUNITION

6-65. Timely resupply of ammunition is critical. To determine the requirements for a specific operation or time, Patriot units develop a required supply rate (RSR) for each type of ammunition. Expressed as rounds per weapon per day, the RSR may derive from experience or from reference manuals. The operations officer (S3) prepares the RSR for the commander during the planning stages of the operation. Requests are consolidated at each level until they reach the highest Army headquarters in the theater (corps and EAC). At that level, the G3, G4, and commander review the requirements and availability of ammunition. Based on this review, the force commander establishes a controlled supply rate (CSR), the actual resupply rate. The CSR is expressed as rounds per weapon per day by ammunition item. The OPLAN or OPORD will normally identify those ammunition items for which the CSR is less than the RSR. After consulting with their operations and logistics staff officers, commanders will normally establish priorities for the allocation of ammunition.

6-66. The unit basic load is the quantity of conventional ammunition authorized and required by a unit to sustain itself until normal resupply can be affected. The unit basic load must be capable of being carried in one lift by the unit's soldiers and organic vehicles. SOPs will prescribe distribution of the basic load. In a mature theater, units will have their basic load. Units deploying to a theater normally carry their basic load with them. However, a unit arriving in theater without a basic load will receive it at a designated ammunition supply location. A unit's basic load is designed to meet its anticipated initial combat needs and is influenced by the following factors:

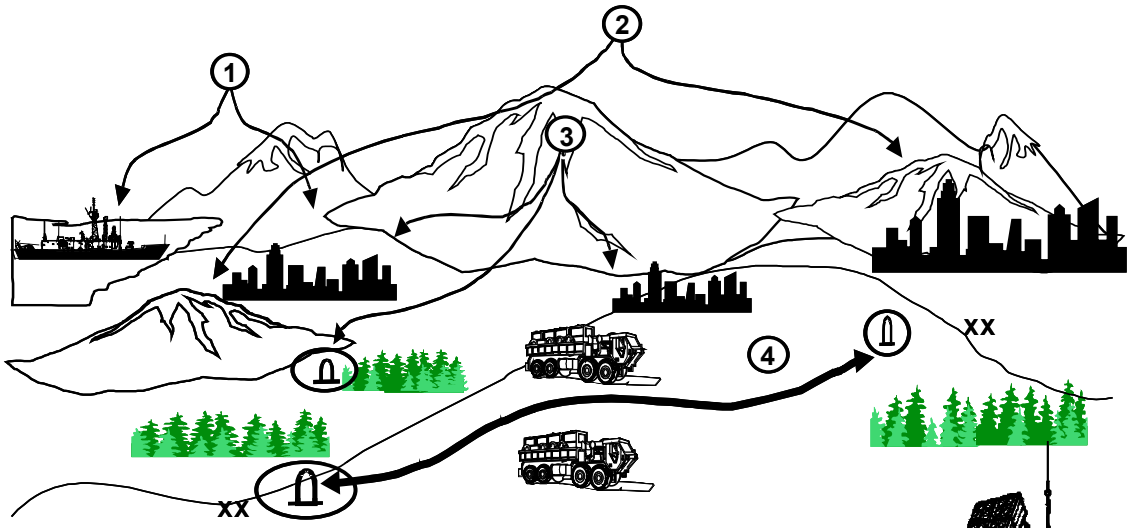
- Mission.
- Types and numbers of weapon systems.
- Transport capability.
- Time required to conduct resupply.

6-67. For requisition of Patriot missiles, (missile support) the battalion S4 generates requests based on missile expenditure reports submitted to the S3. The S4 coordinates these requests with the ADA brigade S3 or corps/theater (G3) before submitting his paperwork to the appropriate ammunition transfer point (ATP), ASP, corps storage area (CSA), or theater storage area (TSA). The requests are prioritized at brigade by the S3 in coordination with the brigade S4 to ensure that there is no impact on the brigade's mission. The battalion is then notified of what has been approved for annotation using the necessary paperwork.

6-68. Patriot missiles are classified as conventional ammunition, and as such arrive at the theater of operation from the continental United States (CONUS) using the same channels as conventional ammunition see Figure 6-2 for illustration. From port areas, missiles move directly to the TSA. Theater transportation assets can make delivery of high-cost, low-density missiles such as Patriot directly to the Patriot battalion from the theater storage area (throughput). This is the desired method of delivery. The battalion accepts delivery in or near the battalion area. In emergencies, Army aviation assets may be used to airlift Patriot missiles directly from the CSA to the battalion or fire unit.

6-69. Missile resupply operations depend on the tempo of combat operations, the number of missiles available in the theater, and the availability of transport. Resupply may be either centralized (push) at battalion or decentralized (pull) at battery.

6-70. Key considerations have to be taken into account by commanders and staff officers when deciding how to structure missile resupply operations. First, the guided missile transporter (GMT) is the only organic means the battalion has for loading missiles onto the launcher. If GMTs are used for transporting missiles, they cannot, at the same time, be used for reloading launchers. Second, the launcher that has fired its missiles is of no use to the battery. Third, Patriot missiles delivered by theater transportation assets directly to the Patriot battalion area may be delivered in military vans (MILVANs). Upon receipt of the MILVANs, the battalion S4 is responsible for the unloading of the missile canisters.




**Legend:**

1. **Missiles arrive at the theater of operations.**
2. **In the theater, it moves through fixed ports or over the shore.**
3. **Once ashore, it moves to one of several destinations depending on theater needs. Whenever possible, ammunition resupply bypasses intermediate supply facilities to reduce standing ammunition storage. Missiles go directly to battalion ATPs for quicker delivery and usage.**
4. **Patriot units pick up and deliver their own missiles.**

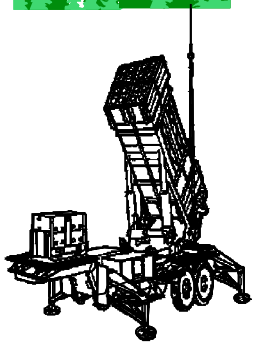


**Figure 6-2. Ammunition Supply**

6-71. The S4 must use two 10-ton all-terrain forklifts for removing missiles from MILVANs and loading GMTs. The battalion must request use of forklifts from service support.

6-72. Under centralized Patriot missile resupply in Figure 6-3, theater or corps transportation assets, or host nation transportation support, move missiles forward to ATPs designated by the brigade. This point should be located within the AO. Current Patriot TOEs establish a missile resupply section under the supervision of the battalion S4. This section includes the personnel and equipment necessary to operate five missile resupply teams (based on location of theater).

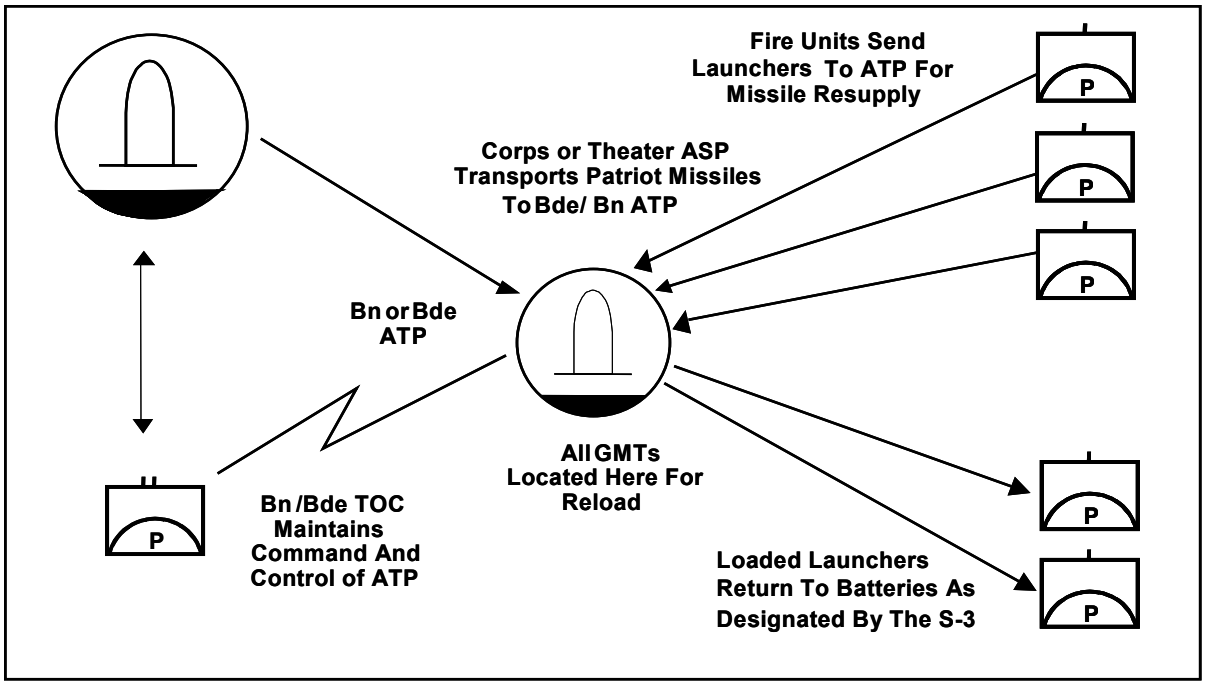



**Figure 6-3. Centralized Patriot Missile Resupply**

6-73. The missile resupply section operates the centralized facility that provides the batteries with ready-to-fire missiles. The battery sends the launcher to the missile resupply point. When the launcher has been loaded, the reload crew chief notifies the battalion S3, who decides where that launcher should go. The centralized concept assumes that launchers may not go back to their own battery, but will be sent where the tactical situation dictates they are most needed. The ability to communicate between the battalion TOC and the missile resupply point is critical. Launcher section chiefs must be able to navigate well for this concept to function effectively. The decision to provide the missiles to a battery is based on the tactical situation and mission requirements.

6-74. Decentralized missile reload has two possible variations. The first is battalion control; where the battalion retains control over all reload assets. This requires the battalion missile resupply section to pick up, deliver, and load missiles at the batteries designated by the S3. The second is battery control, where the battalion attaches GMTs to the batteries for them to pick up their own missiles. As shown in Figure 6-4, the battery uses an attached battalion missile resupply vehicle to pick up missiles from the closest CSA/ASP or division ATP. The battery then transports the missile to its location where the missiles are either stored or placed on launchers. Both variations of this concept should be used when the tempo of combat operations in corps areas is slower, or in theater rear areas where batteries may be located close to ASPs. Considerations for centralized missile reload are organic transportation for missiles by each battery. If the battery does not have a working GMT or other available transportation, they would need to take their LS to a centralized location for reload determined by the battalion. Considerations for decentralized would include time constraints and LSs

being completely expended or partially expended. Depending if the operations tempo is fast or slow the commander would make the decisions on whether to have the missiles delivered to site, or to take the LS to the ASP for reloading. Decisions for use of centralized versus decentralized must be carefully planned to provide a continuous firing capability.

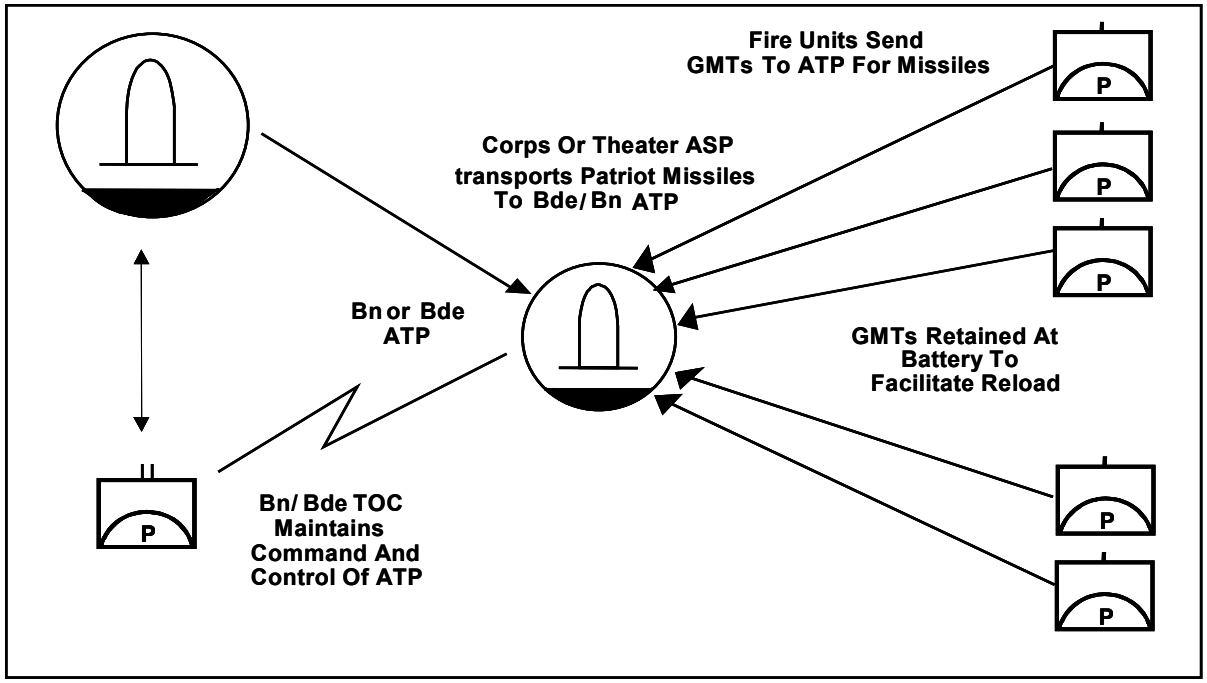



**Figure 6-4. Decentralized Battery Control for Patriot Missile Resupply**

## CLASS VI--PERSONAL DEMAND AND MORALE ITEMS

6-75. Class VI includes candy, cigarettes, soap, cameras (nonmilitary sales items), and sundry packs. Requests for Class VI support are submitted by the S1 through supply channels when an Army exchange is not available. Resupply flow is the same as for Class I resupply.

## CLASS VII--MAJOR END ITEMS

6-76. Launchers, generators, vehicles, and other major end items are Class VII supplies. Major end items are issued in combat based on battle loss reports. Large items may be delivered by COSCOM directly to the battalion trains. Smaller items are picked up by the S4 at the distribution point in the theater or corps support area. The battalion XO sends ready-to-fight weapons systems forward with the LOGPAC.

## CLASS VIII--MEDICAL SUPPLY

6-77.The medical platoon maintains a 2-day (48-hour) stockage of medical supplies. Normal medical resupply of the platoon is performed through backhaul. Medical resupply may also be by preconfigured Class VIII

packages (push packages) throughput from the forward medical logistics (MEDLOG) battalion located in the corps support area.

6-78. In a tactical environment, the emergency medical resupply (ambulance backhaul) system is used. In this environment, medical supplies are obtained informally and as rapidly as possible, using any available medical transportation assets. The medical platoon submits supply requests to the supporting medical company. Ambulances of the medical platoon perform class VIII resupply of combat medics.

## CLASS IX--REPAIR PARTS AND COMPONENTS

6-79. Class IX includes kits, assemblies, and subassemblies—repairable or unrepairable—, which are required for maintenance support of all equipment. ADA brigade, battalion, or battery unit maintenance personnel submit Class IX requests and turn-ins to their supporting DSUs. Corps and theater army ADA units receive Class IX support from the non-divisional maintenance company (DS) assigned to either the COSCOM or the TAACOM. The corps missile support company and the missile support company (EAC), respectively assigned to the COSCOM or TAACOM, provide missile Class IX and repairable exchange (RX) supply support to customer units. The designated non-divisional maintenance company (DS) maintains the ASL for corps and theater army units. ASL stockage is determined by the corps materiel management center (CMMC) or the TAACOM MMC.

6-80. The Patriot Maintenance Company (DS) is authorized a shop stock of DS replaceable items, while organic battery maintenance elements are authorized a PLL.

6-81. Batteries obtain Class IX supply support for their PLLs. Requirements for parts not supported by the PLLs are submitted on DA Form 2765 or requested by the unit-level logistics system.

6-82. RX for selected repairable items (to include components, racks, and major assemblies) is accomplished by exchanging the unserviceable item for a serviceable item. Unserviceable items must have a DA Form 5988E attached so the maintenance support activity can do a quality assurance (QA) inspection. RX items are normally limited to those authorized for replacement by supported units.

6-83. Unit PLLs submit requests to their supply element. This allows validation of mission critical repair parts at the supporting supply element. From there, requests are delivered or transmitted to the non-divisional maintenance company ASL and from there to either the CMCC or the TAACOM MMC.

6-84. The CMCC or TAACOM MMC provides document control and supply management for the items requested. Supply management is accomplished by a combination of manual and machine methods. DSU procedures provide increased management control. The materiel officer (MATO) can introduce criteria and parameters to be programmed so machine methods may be used to control available assets, or manual intervention can be used when human judgment is required.

6-85. Receipt, storage, and issue of items are done under the direct supply support (DSS). Class IX items arriving in the battalion are received by the battalion maintenance company's technical supply operating elements. Non-stockage list (NSL) items are forwarded directly to the units that ordered them. Turn-ins are handled in the same manner as receipts and are reported.

### CLASS X--NONMILITARY ITEMS

6-86. Material to support nonmilitary programs such as agriculture and economic development (not included in Classes I through IX) is Class X. These items are requested and obtained by the S4 based on civil-military requirements. Specific instructions for request and issue of Class X supplies are provided by division or higher.

## MAINTENANCE

6-87. Maintenance is sustaining materiel and equipment in an operational status, restoring it to serviceable condition, and upgrading functional abilities through modification. These functions are performed at four levels—organizational, DS, GS, and depot. Successful maintenance at these levels is the key to a unit's ability to shoot, move, and communicate. Therefore, maintenance must be a top priority at all levels.

### OPERATOR MAINTENANCE

6-88. A key aspect of maintenance is the ability to repair equipment quickly and as close as possible to the point of equipment failure or damage. The operator is the first link in the chain of maintenance followed by the organizational mechanics of the using and or owning unit. These soldiers must use their fullest capabilities to reduce downtime and to identify organizational deficiencies. If a deficiency is beyond organizational-level capability, then DS-level or GS-level maintenance is requested.

### DS/GS MAINTENANCE

6-89. The function of direct support maintenance is to repair end items and return them to the user and or owner unit. It must be mobile and support focused as far forward as possible.

6-90. Direct support (conventional) maintenance units perform maintenance on an area or task basis in the theater of operations. Each DS maintenance unit establishes and operates maintenance collection points (MCPs) and base maintenance areas for support of all customer units. Certain units may have the job of providing area support and backup support to other maintenance units during surge periods or to provide reconstitution support. In cases such as these, mobile augmentation (tailored support) teams may be assigned.

6-91. DS maintenance units use maintenance support teams (MSTs) or contact teams to provide close-in support and on-site repair (fix forward) of critical systems. DS maintenance units will then establish base operations and MCPs for repair of equipment, which cannot be repaired on site. Their

capabilities and capacities are tailored to the types and densities of equipment and units for which they provide support. The MSTs are deployed from the maintenance units to supported unit MCPs or directly to downed equipment evacuated to a safe position, depending upon the situation.

6-92. The MST's maintenance capability is constrained by time, environment, and total maintenance burden. At supported unit MCPs, teams must assess the total maintenance burden with the objective of returning the maximum number of weapon systems to combat in the minimum amount of time. Thus, full use of controlled substitution and cannibalization is made. The tactical situation is the overriding factor. By using diagnostic test sets, the MSTs can concentrate on component or assembly replacement. The unserviceable components are sent to the DS maintenance unit.

6-93. For DS maintenance units, emphasis is placed on repair of end items, and some repair of components and modules. The extent of maintenance performed is restricted by time available for repair, availability of repair parts, resupply, workload, and priorities. The DS maintenance is performed at corps level by the non-divisional maintenance company (DS) assigned or attached to the CSB/CSG in the COSCOM. DS maintenance is performed at EAC by the non-divisional maintenance company (DS) assigned to the maintenance battalion of the ASG or TAACOM. These COSCOM or TAACOM missile support DS maintenance units provide DS or backup DS to the Patriot battalion or battery, and have a Class IX repair parts direct support supply mission. These units maintain ASLs and RX functions, which reflect the items in demand-supported stocks. Parts and RX items are also provided to the MSTs in the repair of end items or components. If the maintenance unit is unable to repair Patriot end items or components at its level, the end item or component is sent to depot. GS maintenance is primarily limited to repair and return to the supply system. GS maintenance is provided at the COSCOM or theater level.

## DEPOT-LEVEL MAINTENANCE

6-94. Depot-level maintenance is performed in fixed facilities and is production-oriented. The mission is primarily rebuilding or refurbishing end items and some components. Repair time guidelines are not established.

## RECOVERY AND EVACUATION

6-95. Each unit is responsible for recovering its own damaged equipment. Wreckers and other recovery vehicles should be used to move irreparable equipment to collection points along designated routes. Immovable items remain in place until supporting maintenance units can recover them. Unserviceable materiel should be recovered to the nearest collecting point or main supply route (MSR) as appropriate, and should be protected from pilferage and deterioration. Maximum use is made of on-site repairs before unserviceable equipment is recovered. Using units should attempt recovery within their capability and request assistance from the supporting element, when necessary.

6-96. Evacuation begins when recovery operations end. It is a coordinated effort between maintenance, supply, and transportation elements. It includes end items and unserviceable assemblies and components. Evacuation of unserviceable materiel starts at the DS maintenance collection point or designated MSR.

6-97. Commanders must establish priorities for recovery and evacuation of materiel under their control. Priorities established should offer the greatest potential for the early return of equipment to service.

## OPERATIONAL READINESS FLOAT

6-98. An operational readiness float (ORF) is a major end item to provide replacement for an unserviceable item of equipment when repairs cannot be accomplished within a command set time.

6-99. Selected ORF end items are maintained by maintenance companies supporting the ADA battalions (brigade when appropriate). The responsible major commander (theater and corps) establishes policies and procedures for control of these float assets. The issue of items from float stocks is rigidly controlled. Within the ADA brigade, the battalion commanders establish policies and procedures for the control and use of float assets.

6-100. The authorized ORF for the ADA brigade is carried by the maintenance operating elements located in the brigade support area. Maintenance elements in the battalion trains areas are not normally capable of providing a float, although specific items may be retained by the battalion support elements. ORF assets must be accounted for, and ORF items should be maintained in a ready-to-issue state by DS elements.

## MAINTENANCE DEFINITIONS

6-101. Maintenance definitions are discussed below. These methods are used when required parts, components, or assemblies cannot be obtained in a timely basis through normal Class IX supply channels.

## CONTROLLED EXCHANGE

6-102. Controlled exchange is authorized by battery commanders for the systematic removal of serviceable parts from unserviceable equipment for immediate use to restore a like item to readiness. When controlled exchange is practiced, the serviceable part is removed and replaced by the unserviceable part. Controlled exchange is performed at the organizational and intermediate maintenance levels.

## PARTS CANNIBALIZATION

6-103. Parts cannibalization is authorized by the battalion commander for removal of serviceable repair parts, components, or assemblies from unserviceable, uneconomically repairable, or excess end items of equipment authorized for disposal. It is a supply source for authorized low-mortality or difficult-to-obtain repair parts. Additionally, cannibalization is a source for high-priority items when delivery cannot be made by the required delivery

date. It is also a source for items not stocked in the supply system. This function is normally performed at a cannibalization point. Cannibalization of organic equipment in a peacetime environment is not authorized.

### BATTLE DAMAGE ASSESSMENT

6-104. This is the process of assessing the status of damaged equipment. Trained battle damage maintenance personnel will perform this function. They will make the critical decision whether the equipment will be repaired on-site, recovered, or evacuated. If the decision is to recover or evacuate, the equipment is moved directly to maintenance units with the capability to repair it.

## TRANSPORTATION

6-105. As the connecting link between other logistics functions, transportation moves personnel and materiel. A Patriot battalion is 100 percent mobile. However, higher echelon transportation moves repaired equipment from maintenance units to storage areas or using units, and moves supplies, including repair parts, where they are needed. It also moves personnel replacements from reception areas to combat units.

6-106. The transportation elements within a theater perform three functions: modal operations, terminal operations, and movement management. Modal operations move personnel or materiel in any conveyance by one of four modes: air, rail, road, or sea. Terminal operations shift cargo from one mode of transportation to another or from one type of transport within a mode to a different type. The COSCOM provides integrated movement management and transportation support services through its CMCC and corps movement control teams (CMCTs). Light-medium or medium transportation truck companies are assigned or attached to corps support battalions as required, while a mix of light-medium and heavy truck companies are assigned or attached to the corps-level transportation battalion.

6-107. Command and control of the battalions are exercised by the corps support group (CSG). In the theater army, the Transportation Command (TRANSCOM) provides command and control of attached or assigned motor transport units engaged in line-haul operations, and in support of the TAACOM supply and maintenance missions. The Theater Army Movement Control Agency (TAMCA) provides movement management and highway traffic regulation through its subordinate theater army regional movement control teams (RMCTs), movement regulating teams (MRTs), and air terminal movement control teams (ATMCTs). Theater army motor, aviation, rail, terminal service, and terminal transfer units operate in the COMMZ and combat rear area, as well as in the corps AO, as required. Delivery and retrograde transportation services can be provided all the way into the division sector, if needed.

## FIELD SERVICES

6-108. Field services are services required by units in the field but not usually available with the units. Clothing exchange and bath (CEB) and

mortuary affairs services are provided on an area basis by the field service company and mortuary affairs elements respectively assigned or attached to the CSG or ASG. Field services generally include—

- Mortuary affairs.
- Airdrop.
- Bath/ laundry.
- Clothing exchange.
- Bakery.
- Textile renovation.
- Salvage.
- Decontamination.
- Clothing renovation.
- Post exchange sales.
- Provision of general duty labor.

6-109. These are generally divided into the classifications of primary and secondary field services.

- The primary field services are those considered essential to the support of combat operations. Mortuary affairs and airdrop comprise the primary classification. These are necessary from the beginning to the end of hostilities. The Army must always take proper care of its dead. Airdrop is also essential. It provides a method of supply delivery that is responsive and fast enough to meet the demands of modern battle. Details on airdrop services are in FM 4-20.42.
- The secondary classification consists of those field services that are not immediately critical to combat operations. Mortuary affairs procedures are controlled by the S4. All procedures for field services must be covered in battalion SOPs.

## REAR AREA BASE SECURITY

6-110. Rear area and base security includes rear area combat operations (RACOs) and area damage control (ADC) activities. The purpose of rear area base security operations is to prevent interruption of combat, combat support, and CSS operations, and to minimize the effects when interruptions occur as a result of enemy activity, sabotage, or natural disaster. Those actions taken to prevent, neutralize, or defeat hostile actions against units, activities, and installations in the rear area are RACOs. ADC activities are those prevention and control measures taken prior to, during, and after an attack or a natural or manmade disaster to minimize its effects.

### REAR AREA COMBAT OPERATIONS

6-111. The ADA brigade has defined responsibilities for RACO. The ADA brigade or battalion participates in RACO, which is the responsibility of the corps or theater support commander. The RACO commander has tasking authority for all units within rear areas. The ADA brigade S3 has primary staff responsibility for rear AD planning and coordination for the brigade. In

coordination with the S2 and S4, he plans and assigns ADA brigade rear area protection (RAP) responsibilities for RACO.

**FORCES**

6-112. Each unit provides its own local self-defense and assists in the defense. The battalion S3 may be required to provide support operations with combat forces to secure critical areas and resupply routes, escort convoys, or counter hostile forces that threaten accomplishment of the support battalion mission. Surveillance and security for those areas not essential to accomplishment of the support battalion mission are the brigade's responsibility.

**MEASURES**

6-113. Unit personnel are trained by the battalion in basic defense techniques including passive AD measures and use of non-AD weapons against attacking aircraft. Communications and warning systems are established, SOPs are developed, and OPLANs for reaction forces are developed and rehearsed. Protection is provided for personnel, key activities, and essential lines of communications. Operations are dispersed, and defensive positions are prepared consistent with the effective execution of the mission. Other RAP measures employed include–

- Conducting a vulnerability analysis of the rear area to determine which battalion elements and facilities are the most vulnerable to enemy attack.
- Prescribing instructions for the coordination of local security plans of adjacent units.
- Employing an alert system to provide early warning and notice of enemy activity.
- Requesting armed aircraft escorts for resupply flights and armed escorts for surface convoys.
- Posting security elements from attached security forces at critical locations on the MSRs.
- Employing local route reconnaissance and patrols.
- Enforcing light and noise discipline.
- Employing natural and artificial obstacles.
- Performing NBC reconnaissance, chemical detection, and radiological monitoring and survey operations.
- Coordinating with the battalion S2 to ensure adequate counterintelligence support for the detection, prevention, and neutralization of hostile intelligence threat.
- Coordinating with the appropriate local civilian and paramilitary authorities and forces. If control of the civilian population becomes a prime factor in RAP operations, a request may be submitted to the ADA brigade S3 for additional psychological operations support and military police support to control refugees and displaced personnel.
- Coordinating with the brigade S3 and with the military police unit for area security operations. These operations may include area reconnaissance, convoy security, security of critical points along

MSRs, and chemical detection and radiological monitoring and survey operations along the MSRs.

6-114. When enemy activity exceeds the capability of Patriot units, military police provide the initial force to close with and destroy enemy forces. In the event of a large-scale enemy incursion, tactical forces will be required.

## AREA DAMAGE CONTROL

6-115. The battalion S4 has primary staff responsibility for ADC within the battalion AO. The battalion S3 is responsible for the plans and activities necessary to reduce the effects of enemy attack or natural disaster on battalion elements. During the planning and supervising of ADC, the priority is on actions that prevent or reduce the interruption of CSS operations. The battalion commander and staff must be aware of any diversion of CSS elements to an ADC mission.

## FORCES

6-116. The personnel and equipment of subordinate units located in the area are the principal ADC means available. Coordination with the brigade staff for engineer, military police, and signal support is essential in ADC activities. Locally procured resources and assistance from nonbrigade units located in the brigade support area (BSA) may be available in some situations.

## MEASURES

6-117. Area damage control measures include–

- Providing SOPs and implementing instructions for self-help.
- Designating, training, and employing firefighting, damage clearance, decontamination, rescue, food service, chemical detection, biological sampling, radiological survey, medical, chaplain, and repair personnel. Each unit will organize teams with appropriate skills and equipment.
- Assessing the extent and significance of damage and instituting area damage control measures to reduce the effects of losses in personnel, materiel, and facilities.
- Ensuring that coordination is made for military police to control traffic, conduct law enforcement, and protect designated personnel, facilities, units, and installations.
- Rerouting traffic, as required, to provide continual support to tactical elements and to facilitate the reduction of damage and contamination.
- Dispersing units and facilities to reduce their vulnerability to attack by enemy forces and nuclear, chemical, or biological weapons.
- Establishing warning procedures for prompt information dissemination of known or suspected attacks and natural disasters. Preparations must be undertaken to reduce vulnerability. The warning system should include fallout prediction, if appropriate.

- Coordinating battalion area damage control plans with local host nation authorities.
- Coordinating with other units located nearby for their roles in the area damage control mission.
- Establishing and coordinating a health service support (HSS) plan for mass casualty situations.

### OPERATIONS SECURITY

6-118. Operations security (OPSEC) deals with protecting military operations and activities by identifying and eliminating or controlling intelligence indicators that the enemy could use. It is concerned with the protection of both classified and unclassified data that hostile intelligence agencies could process into military intelligence. It includes physical security, signal security (SIGSEC), and information security. OPSEC consideration must be a routine part of operations. It must become second nature to CSS planners and operators in all types of units and at all levels of command.

6-119. Modern military forces are increasingly dependent upon electronic devices for command and control, employment of forces, weapons security, and logistics support. This dependence makes them vulnerable to hostile actions designed to reduce the effectiveness of friendly Communications-Electronics (CE) devices. Command posts, weapon systems, and logistics bases cannot survive during force-projection operations if they are easily identified and located because of their electromagnetic emissions. Tactics, which conceal emitters or deceive the enemy as to their identity and location, are vital to successful operations.

6-120. Because of technical advances in intelligence collection, sensors, communications, and data processing, survival on the battlefield requires extensive countersurveillance. Countersurveillance must be a state of mind; a skill reduced to habit, where everyone practices camouflage, noise, light, litter, smoke, and communications discipline. OPSEC considerations must be included in all CSS plans.

## RECONSTITUTION

6-121. The increasing capabilities and lethality of modern weapon systems greatly increase the chances of high losses of troops and equipment over short periods. The success or failure of Patriot units during the air attack depends upon their ability to reconstitute their combat power. The quality of prior planning will determine how quickly Patriot units will be able to reenter the air battle.

### RECONSTITUTION PRINCIPLES

6-122. Reconstitution consists of non-routine actions taken to restore damaged units to a specific level of combat readiness. These non-routine actions are based on priorities established by the battalion commander and result in the receipt of specified available resources to accomplish the reconstitution mission. Commanders have two reconstitution options available for returning a unit to a specified level of combat capability.

## REORGANIZATION

6-123. Reorganization is accomplished within the unit. Reorganization consists of asset cross leveling to form composite teams, sections, platoons, or higher-level units. Since reorganization is conducted internally, it is the most expedient means of maintaining combat power in the early stages of a conflict and in forward units throughout the duration of the conflict. It is the option most often executed by commanders.

## REGENERATION

6-124. Regeneration requires outside support. Regeneration consists of rebuilding a unit by infusing new personnel, equipment, and supplies into a unit and then conducting the necessary training to develop combat effectiveness.

6-125. Regeneration is the more difficult of the two available reconstitution options. It requires a great deal of both outside assistance and time for training. Commanders may choose regeneration as the method of reconstitution because regeneration can preserve the cohesion, trust, and confidence of the unit by infusing new personnel into existing squads and sections.

6-126. Patriot units should attempt to reconstitute at the lowest level possible based on the following considerations:

- Enemy situation.
- Size of the attrited unit.
- Personnel and resources available.
- Availability of ground or air transportation to move resources to the unit or vice versa.
- Future deployment plans for the reconstituted unit.

6-127. Reconstitution responsibilities rest with the commander one level higher than the damaged unit. Reconstitution efforts flow from the platoon leader all the way to the theater commander.

## RESPONSIBILITIES AT BATTERY LEVEL

6-128. The battery commander reestablishes the damaged unit's AD capability. A key ingredient for the return of unit command and control is the initiation of damage assessment leading to subsequent reconstitution efforts. Unit reconstitution points, the predetermined chain of command, decontamination procedures, and the requirements for determination of equipment operability following enemy attack must be addressed in detail in unit SOPs.

## PRIORITIES

6-129. SOPs must also address specific priorities for reconstitution. Prioritization should always be oriented towards reestablishing the combat power of the unit.

## MEDICAL SUPPORT PROCEDURES

6-130. Medical support procedures are carried out as the unit attempts to reestablish $C^2$ within the unit and to higher headquarters. Soldiers perform buddy aid on wounded personnel, and unit teams initiate rescue, collection, identification, and separation of contaminated casualties. Combat medics triage, treat, and request evacuation of patients. Predesignated field ambulances evacuate the critically injured to the battalion aid station.

## COMMANDER'S ASSESSMENT

6-131. The battery commander and key personnel determine soldier and equipment losses. The commander assesses the unit's capability to function in the air battle, and the unit forwards the information to the battalion using a standardized weapons system status report.

## BATTLE DAMAGE CONTROL

6-132. The battle damage control team saves as much equipment as possible and estimates the requirement for further assistance. The damage control team forwards this estimate as part of the unit report.

## DECONTAMINATION

6-133. In the presence of NBC agents, the unit conducts decontamination as soon as possible. The decision to do hasty or deliberate decontamination will depend on the situation, the extent of contamination, decontamination resources, and the mission. Only that which is necessary to accomplish the mission is decontaminated.

## SUPPORT UNIT RECONSTITUTION

6-134. The same basic reconstitution procedures apply to the DS unit. The battalion supply and equipment (BSE) manages the reconstitution of the DS maintenance unit. The scarcity of Patriot assets and ORFs makes DS maintenance unit reconstitution a critical priority.

## SITE DETERMINATION

6-135. The battery and battalion commanders determine the best location for the reconstitution effort, whether on-site, at a jump location, at the reconstitution point at battalion, brigade, major AD command, or support command. For ground security purposes, the lowest level of reconstitution should be at the battalion. If reconstitution at battalion level is not feasible, the unit jump location should be near a main supply route.

## RESPONSIBILITIES AT BATTALION LEVEL

6-136. The battalion commander is responsible for Patriot battery reconstitution. It is, however, primarily a staff activity (see the following checklist), and the battalion XO is the manager of the reconstitution effort. Based upon priorities set by the S3 and the commander, he manages and

coordinates the activities of the S1, S2, CESO, headquarters battery commander, and DS unit commander. When the battalion receives the status report from one of the batteries, the XO and staff determine the severity of the situation, and the XO dispatches a battalion control and assessment team if he deems it necessary. The XO briefs the battalion commander on the essential elements of the status report and on staff recommendations. The following is a staff checklist for reconstitution:

- S1–
  - Determines availability of replacements.
  - Coordinates personnel replacements.
  - Fills positions based on priorities set by S3.
  - Coordinates medical support.
- S2–
  - Provides threat assessments for rear area reconstitution sites.
  - Advises S3 on the threat situation.
- S3–
  - Recommends priorities for reconstitution to commander.
  - Identifies critical shortfalls.
  - Redesigns air defense based on available firepower.
  - Sets communications priorities.
  - Sets priorities for decontamination.
  - Sets priorities for resupply of Classes III and V (missile) by unit.
  - Monitors Patriot system repair actions.
  - Sets priorities for personnel replacements by MOS and unit.
  - Coordinates locations for hasty and deliberate decontamination.
- S4–
  - Recommends allocation of critical supply items.
  - Coordinates resupply of critical items (Classes I, III, V, and IX) according to the priorities.
  - Coordinates movement requirements to support reconstitution.
  - Coordinates delivery of ORF equipment with the DS unit.

## PLANNING AND TRAINING FOR RECONSTITUTION

6-137. The coordination between the AD chain of command and the corps or theater chain of command is critical. Standardization of procedures during exercises should be emphasized. Staff training in reconstitution procedures at all levels are essential to ensure success in wartime operations. Since Patriot resources are finite, "push-packs" under a program such as the pre-configured unit load program could reduce the transportation requirements for critical Patriot components in a corps area. The criteria and layout of reconstitution points should be addressed in detail in battalion and brigade OPLANs. This is because of the sheer number of activities that must occur.

## Appendix A

# Organization

This appendix describes the organization of the Patriot battalion and its subordinate batteries. It also summarizes the functions of all the organizational elements that comprise the battalion and batteries.

## PATRIOT BATTALION

A-1. The Patriot battalion consists of a headquarters and headquarters battery (HHB) and five firing batteries or fire units (FUs) as shown in Figure A-1. A battalion may be task organized with more or less batteries based on METT-TC.

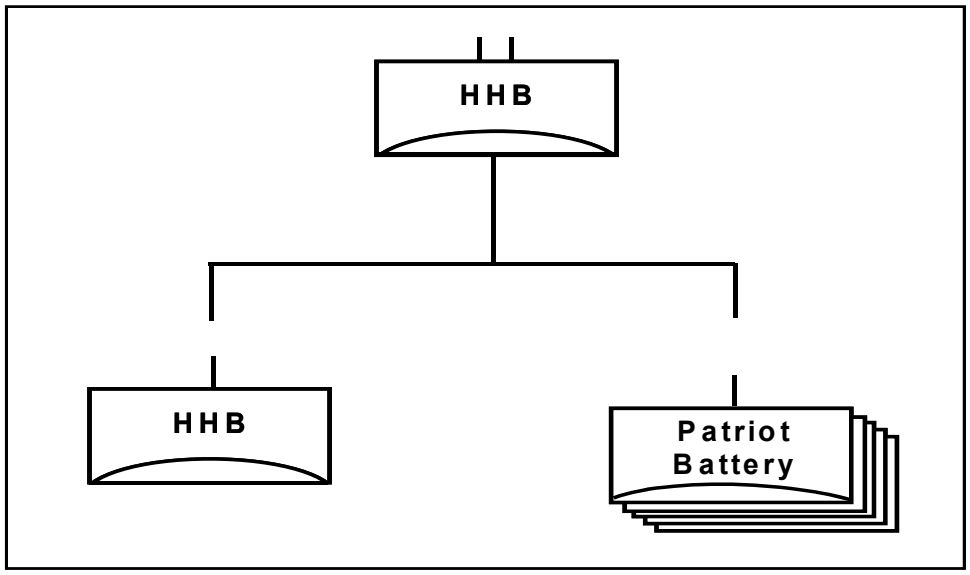



**Figure A-1. Patriot Battalion Organization**

## HEADQUARTERS AND HEADQUARTERS BATTERY

A-2. The HHB is both a tactical and administrative organization and is organized as shown in Figure A-2. When tactically feasible, the HHB is centrally located in relation to other battalion elements, enabling it to provide responsive and timely support.

### BATTALION HEADQUARTERS

A-3. The battalion headquarters provides command, operational control, and administrative and logistical support for the battalion. It is comprised of a command section, an intelligence/operations section (S2/S3), a personnel/logistic section (S1/S4), fire direction center (FDC) section, a communications platoon headquarters, a medical section and a chaplain. The functions performed by these elements are described below in Figure A-2.

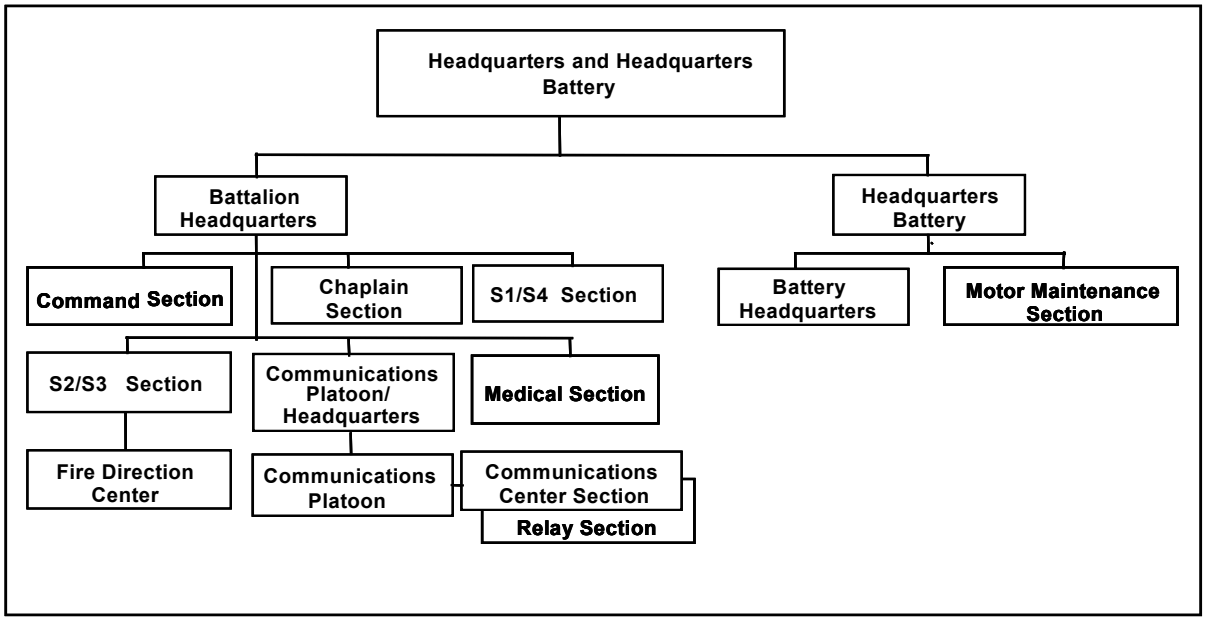



**Figure A-2. HHB Organization**

## COMMAND SECTION

A-4. The command section exercises command and control of the battalion and ensures that functions pertaining to the overall operation of the battalion are properly planned, coordinated, and executed. This section consists of the battalion commander, the executive officer, command sergeant major, and the coordinating and special staff officers. The command section must be able to visit all sites, and also be able to communicate with all batteries and sections within the battalion at any given time. During static and movement operations, the command section uses FM communications to coordinate movements and command and control operations within the battalion.

## CHAPLAIN SECTION

A-5. The chaplain section is responsible for coordinating the religious assets and operations within the command. The section advises the commander on issues of religion, ethics, and morale, and provides pastoral care, personal counseling, and advice. They help the commander ensure that all soldiers have the opportunity to exercise their religion, and develop and implement the commander's religious support program. The chaplain section also provides moral and spiritual leadership to the command and community to include confined or hospitalized personnel, EPWs civilian detainees, and refugees. Due to the nature of the chaplain's duties and responsibilities he may be required to visit all locations within the battalion, and maintain FM communications with the command section.

## S1/S4 SECTION

A-6. The personnel section (S1) is responsible for managing and coordinating all personnel and logistics-related matters. It advises and assists the commander in managing personnel records and reports, personnel

replacements, morale and welfare and discipline. It also coordinates all maintenance and transportation requirements.

A-7. The supply section (S4) is responsible for missile resupply of the Patriot batteries. This section has control over the guided missile transport (GMT) that is used at battery levels. These are the only GMTs organic to the battalion. The S4 section provides organizational maintenance support for the battalion's quartermaster and chemical equipment. The S4 also coordinates all classes of supply, except class VIII (medical) with brigade. They also coordinate the requisition, acquisition, storage of supplies and equipment, and the maintenance of materiel records.

**S2/S3 SECTION**

A-8. The intelligence section (S2) is responsible for managing and coordinating all intelligence and operations-related matters. It collects, processes, and disseminates intelligence information; conducts and coordinates IPB; and coordinates counterintelligence and security operations.

A-9. The operations section (S3) prepares coordinates and distributes plans and orders including command SOPs, OPLANs, OPORDs, fragmentary orders, and warning orders. It also monitors the battle, synchronizes tactical operations, plans movements, supervises the command-training program, and assists in developing the unit's mission essential task list. The S3 supervises the system evaluation team. This team conducts tactical and technical evaluations of the firing batteries and the battalion fire direction center (FDC).

A-10. The intelligence/operations section operates the tactical command system (TCS). A crew consisting of three 14J EWS operators is required to operate the TCS. At least three crews must be available for continuous, 24-hour operations. The TCS directly supports the information coordination central (ICC) by providing automated defense and communications planning for the battalion and provides situational awareness to the commander.

**COMMUNICATIONS PLATOON/HEADQUARTERS**

A-11. The communications platoon includes a platoon headquarters, a communications center section, and a communications relay section. The communications center section is responsible for the operation and maintenance of the battalion radio sets and the battalion wire communications operations. It also handles administration of communications security (COMSEC) material and organizational maintenance of HHB communications equipment (less multi-channel). The communications relay section operates four communications relay groups (CRGs). The CRGs provide UHF (voice and data) and VHF communications to units not having line-of-sight with the battalion FDC.

### MEDICAL SECTION

A-12. The medical section is responsible for coordinating health assets and operations within the command. It plans and supervises the treatment of sick, injured or wounded soldiers; patient and casualty evacuation; preventative medicine services; health education/lifesaver training; and preparation of health-related reports and battlefield statistics.

### FIRE DIRECTION CENTER SECTION

A-13. The FDC exercises direct control and supervision of Patriot FUs and attached THAAD batteries during the air battle. The FDC is responsible for operating the ICC. A crew of three, consisting of one 14E tactical director, one 14E tactical director assistant, and one 31F network switch operator is required to operate the ICC. At least three crews must be available for continuous 24-hour operations. The ICC exchanges data and voice information with the brigade TOC, the Patriot FUs, the THAAD batteries, and adjacent Patriot battalions. If the brigade TOC is out of action, the ICC can establish TADIL-J as a primary or TADIL-B communications directly with the control and reporting center (CRC).

### HEADQUARTERS BATTERY

A-14. Headquarters battery is organized with a battery headquarters section and a motor maintenance section. Headquarters battery supports the battalion. A headquarters battery section also provides command, unit administration, unit supply, and food service functions. It provides refueling and unit maintenance support for vehicles, power generators, and engineer missile equipment. MANPADS teams and equipment are assigned to provide self-defense for the FDC.

A.15. The motor maintenance section provides organizational maintenance for all HHB vehicles, power generation equipment, and air conditioners. The section has refueling equipment for the HHB equipment as well as providing vehicle recovery for HHB.

## PATRIOT BATTERY (FIRE UNIT)

A-16. The Patriot battery organization, as shown in Figure A-3, is comprised of a battery headquarters section, a fire control platoon, a launcher platoon, and a maintenance platoon.

### BATTERY HEADQUARTERS

A-17. A battery headquarters section provides command and control, unit administration, unit supply, medical support, and food service functions. The battery headquarters operates the battery command post (BCP). A crew consisting of two 14J EWS operators is required to operate the BCP. At least three crews must be available for continuous, 24-hour operations. The BCP operates in a manner similar to the TCS. It directly supports the ECS by providing automated defense and communications planning for the battery and provides situational awareness to the commander.

## FIRE CONTROL PLATOON

A-18. The fire control platoon includes a headquarters section and a fire control section. The platoon is capable of sustained operations and is fully mobile. Fire control section's equipment includes the engagement control station (ECS), radar station (RS), electrical power plant (EPP), and the antenna mast group (AMG). During FU operations, the ECS is the only manned piece of equipment. The ECS is operated by a crew of three, consisting of one 14E tactical control officer, one 14E tactical control assistant, and one 31F network switch operator. At least three crews must be available for continuous, 24-hour operations. The ECS controls all engagements, and maintains communications with the ICC. The platoon has the necessary personnel to operate the EPP and perform diesel maintenance. The MANPAD team(s) coordinate for coverage of dead zones and other needed areas through the fire control platoon.

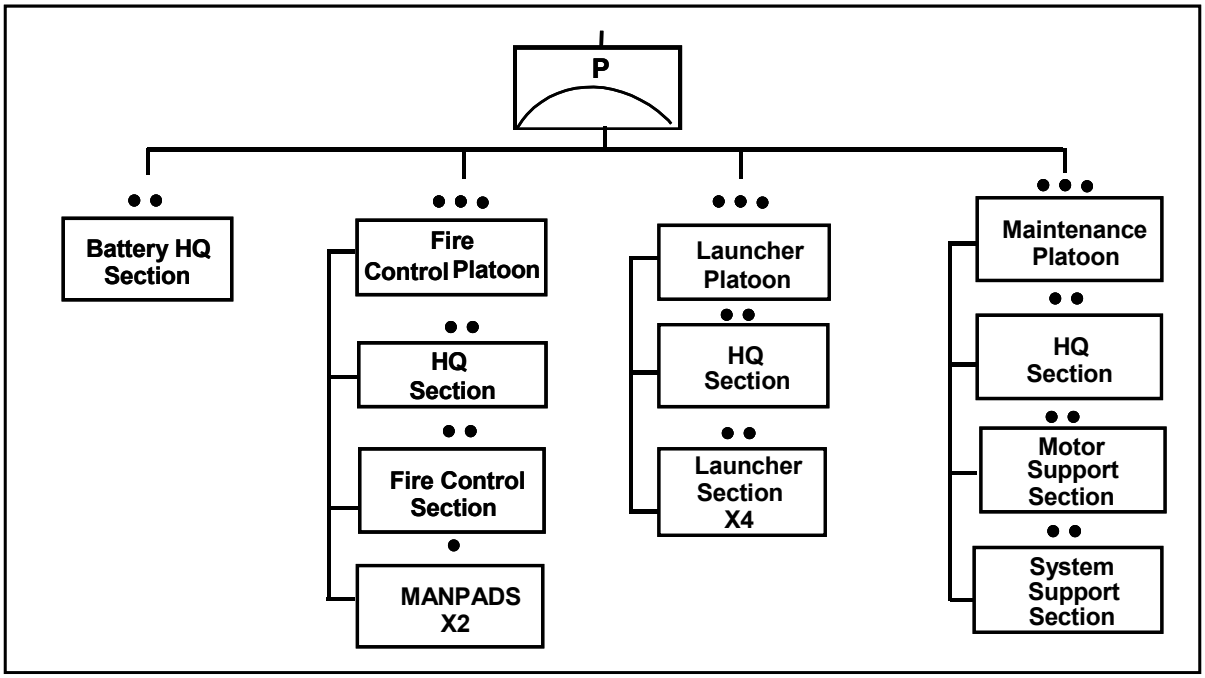



**Figure A-3. Patriot Battery Organization**

## LAUNCHER PLATOON

A-19. The launcher platoon includes a headquarters section, and four launcher sections. Each section has two launching stations. Three personnel, who are capable of LS emplacement, march order, road march, reconnaissance, and sustained operations operate each launching station.

## MAINTENANCE PLATOON

A-20. The maintenance platoon is organized with a platoon headquarters, communications section (headquarters section), motor maintenance section, and system maintenance section. Effective communications, reliable transportation, and system maintenance are essential to the FU's mission. The platoon headquarters exercises command and control over the maintenance platoon. The platoon leaders and platoon sergeants ensure that

PMCS is performed in a timely and coordinated manner for each of their platoons, and for all of the unit's equipment. The motor support section provides organizational maintenance for all organic vehicles and generators, vehicle recovery, and refueling. The prescribed load list (PLL) is divided into two sections: conventional and systems. Each section is responsible for certain types of equipment within the battery. The conventional section maintains a PLL for motor support, communications and basic equipment. The system support section performs organizational maintenance for Patriot system-peculiar equipment, ECS, RS, LS, EPP, AMG, electronics, and maintenance test equipment.

## Appendix B

# Patriot System Equipment

This appendix provides an overview of the Patriot system, describing how the system and its major items accomplish the mission. It also provides a physical description of the major end items, including support equipment organic to the battalion. Finally, it provides the weights and dimensions of all tactical equipment.

## SYSTEM OVERVIEW

B-1. Patriot is a guided missile system designed to defeat the future air and missile threat, which includes theater missiles (TBMs, ASMs, CMs), fixed and rotary wing aircraft and UAVs. The system normally fights as a battalion, which usually consists of five batteries or fire units (FUs) operating under the control of a fire direction center (FDC). However, there are some battalions that currently have six batteries due to theater and type of mission. See Figure B-1 for Patriot system overview.

B-2. Each FU consists of an engagement control station (ECS), a radar station (RS), eight launching stations (LSs), an antenna mast group (AMG), EPP, and support equipment. The ECS is the operational control center for the FU and is manned by three crews of three operator personnel each (TCO, TCA, and communications operator). It contains the weapon control computer, man-machine interfaces, and various data and communications terminals used to accomplish FU functions. The ECS is linked with the RS via cable and with the LS via VHF or fiber optic communications links. The ECS is also linked with the ICC via the AMG, a mobile antenna mast system used to support UHF communications.

B-3. During operations, the ECS receives detection and tracking data from the RS and determines target classification and identity. Tracking and engagement operations information from each FU is sent to the ICC, which establishes and maintains a correlated air picture for the battalion. If the target is determined to be hostile and eligible for engagement, operator personnel in the ECS initiate the engagement, which results in the launch of a missile from the LS. The missile is command guided by the RS to a point just prior to intercept, then acquires and destroys the target.

B-4. The ICC is the operational control center for the battalion and is manned by three operator personnel. The three operator personnel include the TD, TDA, and the communications operator. It contains the computers, man-machine interfaces, and various data and communications terminals used to accomplish the battalion's engagement operations functions. The ICC is linked to the FUs via UHF communications links. The communication relay groups (CRGs) serve as communications relays between the ICC and FUs, allowing the exchange of engagement operations data during the battle. The ICC is responsible for controlling and coordinating the engagement operations activities of the FUs. This includes correlating tracks, establishing

engagement priorities, resolving identity conflicts, and ensuring friendly aircraft are not inadvertently engaged. It also disseminates initialization data to the FUs, ensuring they are properly initialized and configured for engagement operations.

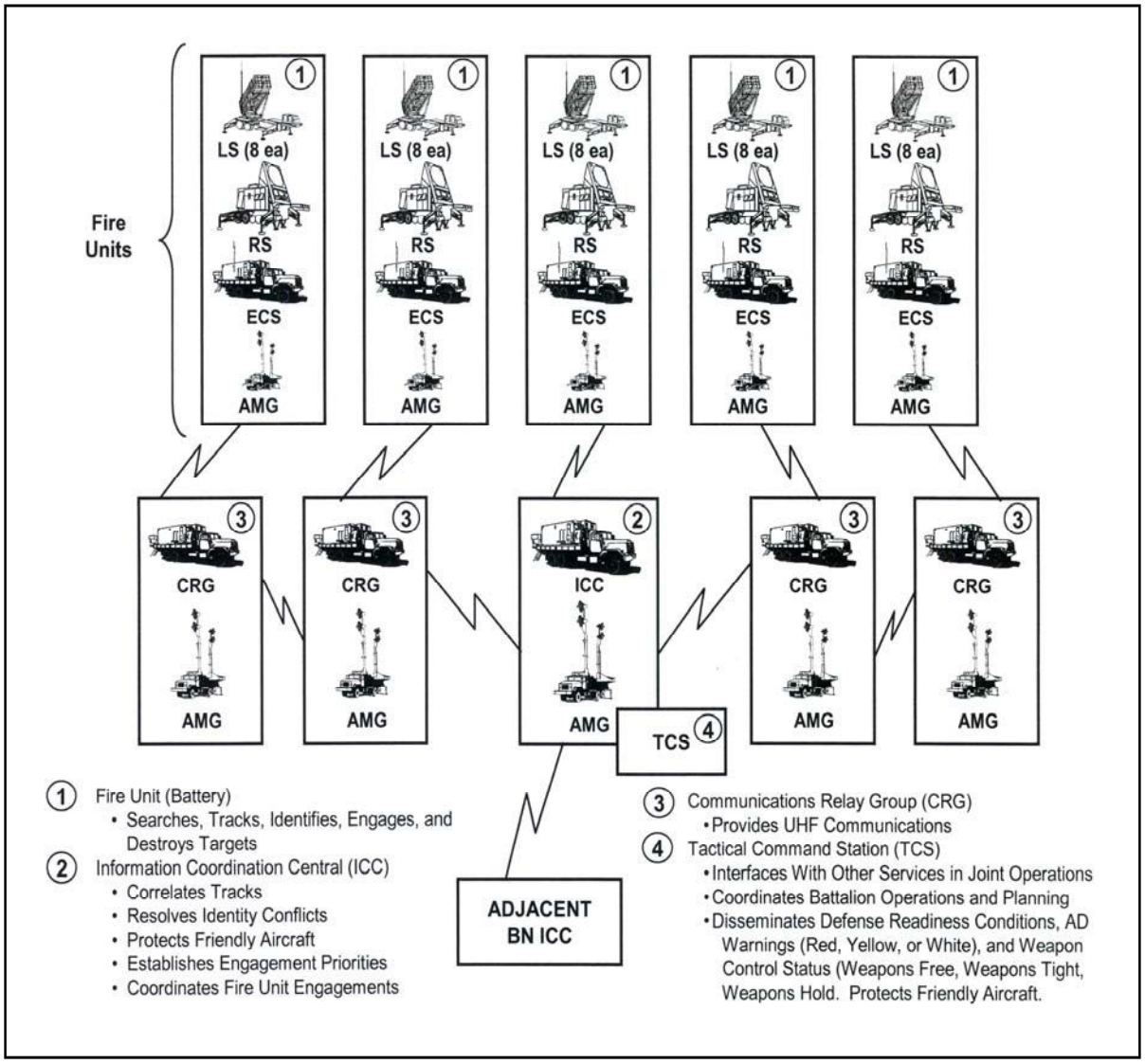



**Figure B-1. Patriot System Overview**

B-5. The crew of the tactical command system (TCS) is responsible for performing deployment planning, defense planning, and other force operations activities in support of battalion operations. The TCS crew disseminates defense readiness conditions, defense warnings, and weapon control status throughout the battalion. They also disseminate initialization data to the ICC, to assist the ICC in proper database initialization and preparation for engagement operations. A crew consisting of three 14J EWS operators is required to operate the TCS. At least three crews must be

available for continuous, 24-hour operations. A 24-hour operation is necessary to ensure continuous coordination is done with the ICC.

B-6. Two support items not shown in the figures are the electric power plants (EPPs) and electric power units (EPUs). The EPP III is the prime power source for the ECS and RS, and consists of two 150-kw generators mounted on a 10-ton HEMTT. The EPU is the prime power source for the ICC and CRGs. Each ICC and CRG has an EPU, which consists of a 30-kw generator mounted on a PU 789M trailer.

B-7. The Patriot battalion also has several other items of support equipment not shown in the figure. These items include the maintenance center (MC), the small repair parts transporter (SRPT), the large repair parts transporter (LRPT), and the guided missile transporter (GMT)–

- The MC is a semi-trailer-mounted shop that contains the tools, handling equipment, and test equipment necessary to maintain the Patriot tactical equipment.
- The SRPT is a semi-trailer-mounted shop used in the FU for storing and transporting small repair parts.
- The LRPT is a HEMTT M977 cargo truck with a light duty material-handling crane. It is used to store and transport large, heavy repair parts.
- The GMT is a modified HEMTT M985 with a heavy-duty crane attached at the rear of the vehicle. It can be used for the delivery, recovery, and loading of guided missiles. It is on the HHB TOE. Whether the GMT remains at the battery or is retained at the battalion (S4) during combat or other operations is determined by how missiles will be resupplied to the battalion.

## PHYSICAL DESCRIPTION OF MAJOR ITEMS

B-8. Physical descriptions of the major end items are provided below. More detailed descriptions of these items, their components, and subsystems can be found in the system technical manuals.

### INFORMATION AND COORDINATION CENTRAL

B-9. The ICC consists of a lightweight weather tight shelter mounted on a 5-ton cargo truck, see Figure B-2 for illustration. The shelter provides shielding from radio frequency interference (RFI) and electromagnetic pulse (EMP) radiation. It is equipped with two externally mounted air conditioners that cool, heat, and ventilate the interior. An externally mounted gas particulate filter unit (GPFU) is used in NBC situations to provide clean air for crewmembers.

B-10. The ICC contains two consoles that are manned by the tactical director (TD) and tactical director assistant (TDA), that are used to execute engagement operations, and a communications workstation manned by a network switch operator. At least three crews of three personnel each must be available for continuous 24-hour operations. Between the two consoles is an ICC status panel that displays the status of all battalion fire units (FU).

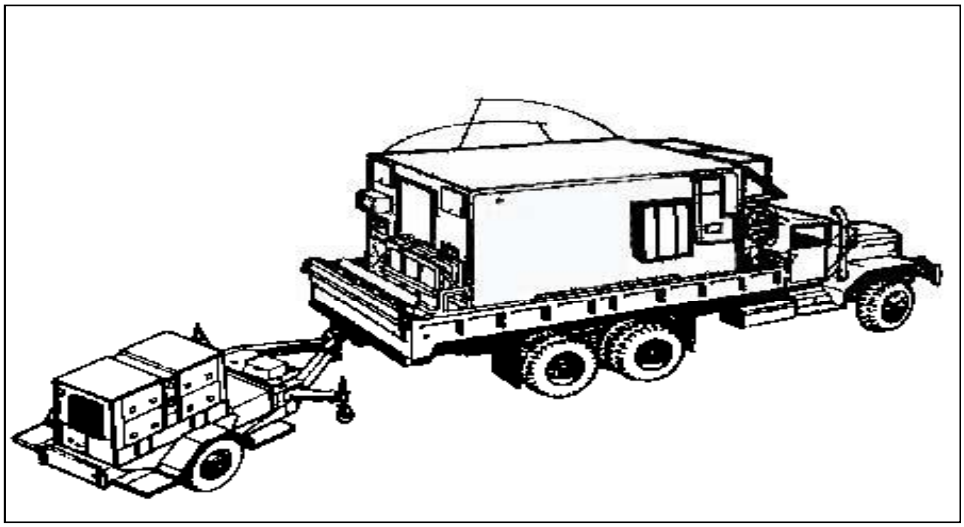


**Figure B-2. Information and Coordination Central With EPU**

## TACTICAL COMMAND SYSTEM WITH AIR AND MISSILE DEFENSE WORKSTATION

B-11. The tactical command system (TCS) is a 5-ton truck mounted expandable shelter shown in Figure B-3 that is a highly mobile all-weather facility emplaced near the battalion ICC. The TCS can be operational while parked at a 10-degree angle from horizontal. It exchanges data with the ICC as well as provides voice communications. It provides the Patriot air defense battalion commander with state-of-the art equipment to implement and coordinate tactical planning and management activities. It is a facility, which accommodates the commander and staff personnel and provides automated equipment to support force operation tasks that develop defense design planning. At least three crews with three personnel each must be available for continuous, 24- hour operations.

B-12. The TCS has active software programs that help planners translate airspace control measures (ACM) for the battalion into Patriot initialization data. The TCS consists of an air and missile defense workstation (AMDWS), and tactical planner workstation (TPW). It can display real time data based on operator selections. The TPWs capabilities include but are not limited to–

- Map display and control.
- Tactical overlays.
- Air situation.
- Deployment planning.
- Battle situation monitoring.
- Send initialization data to the ICC.

B-13. AMDWS is the primary tool for monitoring and managing air and missile defense (AMD) operations. AMDWS maintains a comprehensive database of the tactical situation and also provides mission-planning capabilities to overlay air defense coverage, weapons coverage, airspace control measures, threat locations and planned unit positions. It is used by S1/S4 to manage personnel and logistics functions. It provides an automated

rollup for submitting personnel reports, unit reports, and daily summaries. Some of the capabilities include but are not limited to–

- Send and receive messages and defense plans.
- Maintain personnel and logistics databases.
- Develop and run airbattle scenario.
- Maintain situation awareness of the hostile air threat.
- Provide data required for air intelligence preparation of the battlefield (IPB).
- Maintain situation awareness during ongoing air defense operations.
- Monitor personnel and logistical status.
- Provide for the interface and data exchange between the TCS and other elements of the ABCS.
- Defense design planning.

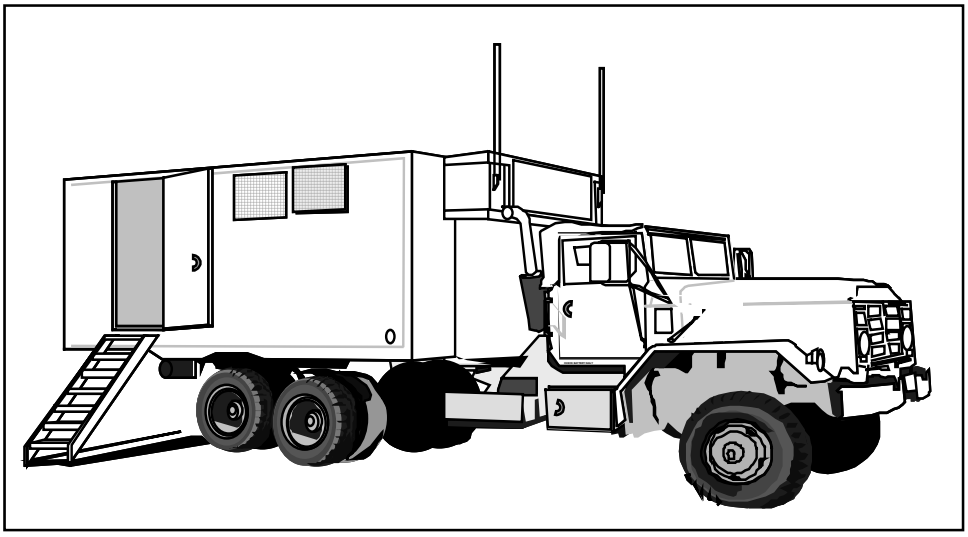


**Figure B-3. Tactical Command System**

## COMMUNICATIONS RELAY GROUP

B-14. The CRG consists of a weather tight NBC proof shelter attached to a 5-ton cargo truck shown in Figure B-4. It is similar in appearance to the ECS. It provides a multi-routed secure, two-way data relay capability between the ICC, its assigned fire units, and between adjacent units. The CRG operates as an LCS, which is critical for remote launch phase-3 operations. The CRG also provides the capability for both data and voice exit and entry communication points with elements that are external to Patriot. A 24-hour continuous operation is needed to meet mission requirements.

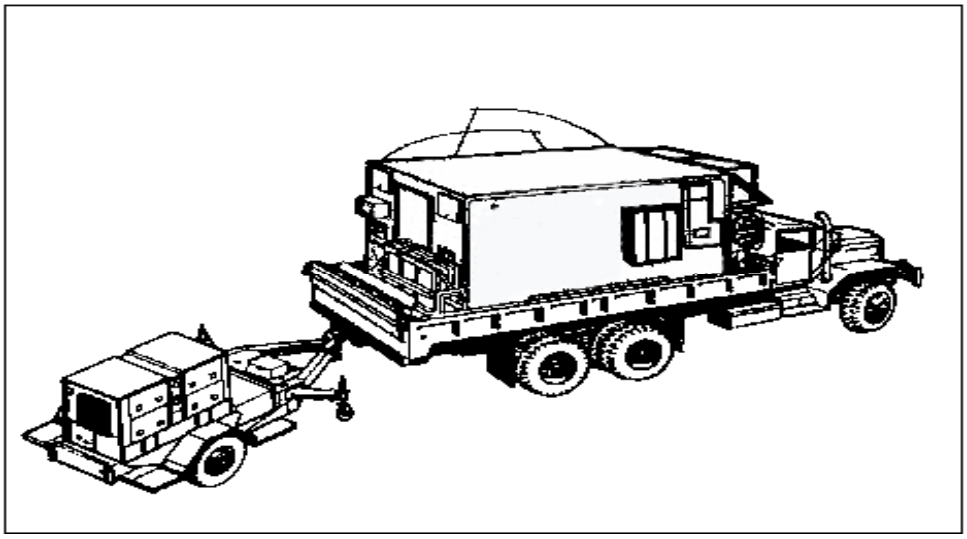


**Figure B-4. Communications Relay Group with EPU**

## ENGAGEMENT CONTROL STATION

B-15. The ECS consists of a lightweight weather tight shelter mounted on a 5-ton cargo truck shown in Figure B-5. The shelter provides shielding from RFI and EMP, and like the ICC, is equipped with two externally mounted air conditioners and a GPFU. The left side as seen from the doorway includes three UHF RRTs and a voice communications station. The right side includes the very high frequency (VHF) data link terminal (DLT), radar weapon control interface unit (RWCIU), WCC, an AN/VRC-92A SINCGARS radio, optical disc drives (ODD), and embedded data recorder. The ECS crew consists of a TCA, TCO and communications personnel. Three crews of three personnel each are responsible for running 24-hour continuous operations.

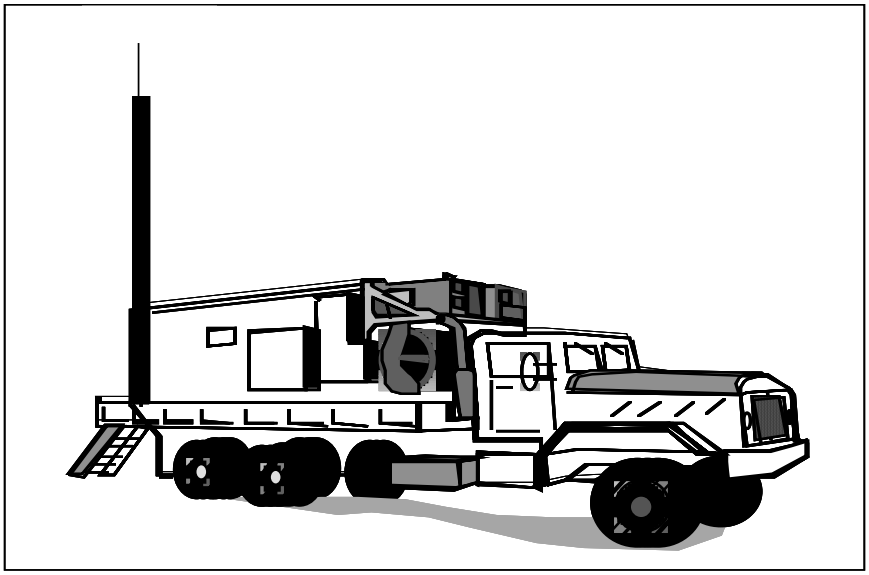


**Figure B-5. Engagement Control Station**

## BATTERY COMMAND POST

B-16. New technology is now being integrated for the battery command post (BCP). The new Patriot battery command post provides shelterized communications, computer and display facilities, as well as working space for the battery commander and his staff, see Figure B-6. BCP equipment includes a high mobility, multi-purpose, wheeled vehicle (HMMWV), with a deployable rapid assembly shelter (DRASH) modular tent, which attaches to the backside of the vehicle.

B-17. Within the vehicle there is an AMDWS station and a common hardware software (CHS) computer with an attached 8mm tape drive and printer. The battery CP is run off a 10-kw generator. Battery CPs has dedicated elements to implement emergency survivability measures in case of chemical or ground attacks.

B-18. The BCP is operated by a crew of two 14J EWS operators. At least three crews must be available for continuous, 24-hour operations. The crewmembers are responsible for operating, maintaining, march ordering and emplacing the Battery CP. Personnel required to support battery CP operations will be early warning system (EWS) operators capable of operating the AMDWS system. Some of the new BCP functions will include—

- Receive TADIL-J and display on battery CP workstation.
- Situation awareness and early warning.
- Automated defense design and planning.
- AMDWS functionality/routing staff support.
- FMS-D functionality.
- Integrated scenario development.
- AMDWS/TAC planner capabilities to support defense planning and air battles.

- Told in intelligence received and processed.

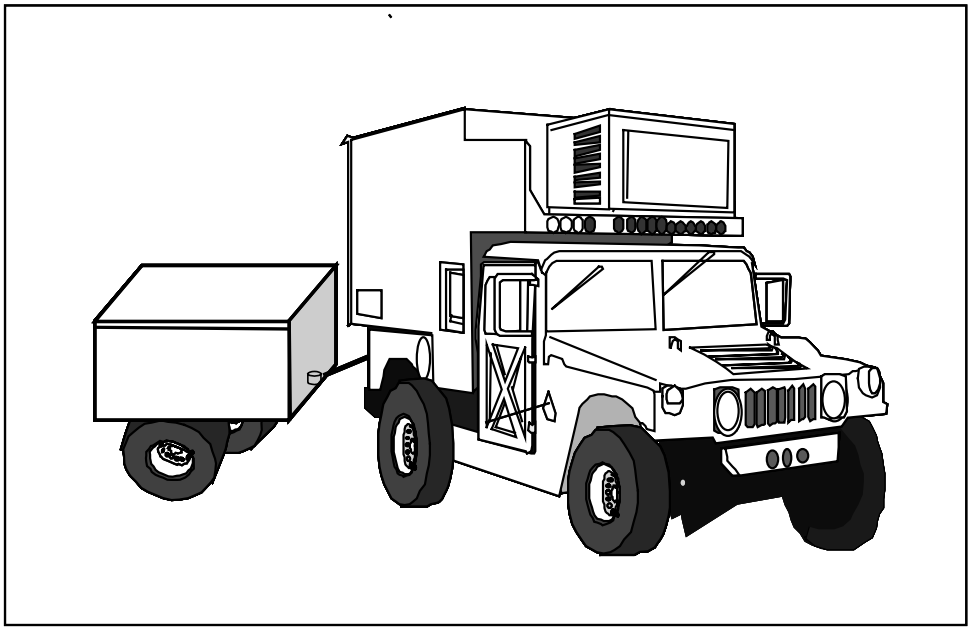


**Figure B-6. Battery Command Post With Trailer**

**RADAR SET**

B-19. The RS consists of a multifunction phased array radar mounted on an M-860 semi-trailer towed by an M983, heavy expanded mobility tactical truck (HEMTT), see Figure B-7. It is monitored and controlled by the ECS via the radar and weapon control interface unit. The RS performs very low to very high altitude surveillance, target detection, target classification, target identification, target track, missile track, missile guidance, and ECCM functions.

B-20. Radar antenna is positioned at the forward end of the shelter and is erected to a fixed 67.5° angle relative to the horizontal plane during emplacement. Integral leveling equipment on the M860 semi-trailer permits emplacement on slopes of up to 10 degrees.

**PAC 3 AN/MPQ-65 radar**

B-21. The PAC-3 AN/MPQ-65 is the radar with the new enhancements that will provide significant improvements in expanded search, threat detection, and identification and engagement capability. In addition, the radar search sector volume has been expanded and a search-tailoring feature has been incorporated. Configuration-3 radar enhancements provide for additional search sectors that improve search and track functions against TBM threats. The addition of the high altitude cruise missile (HACM) search sector enhances the system's ability to detect and counter air-launch cruise missiles (CMs).

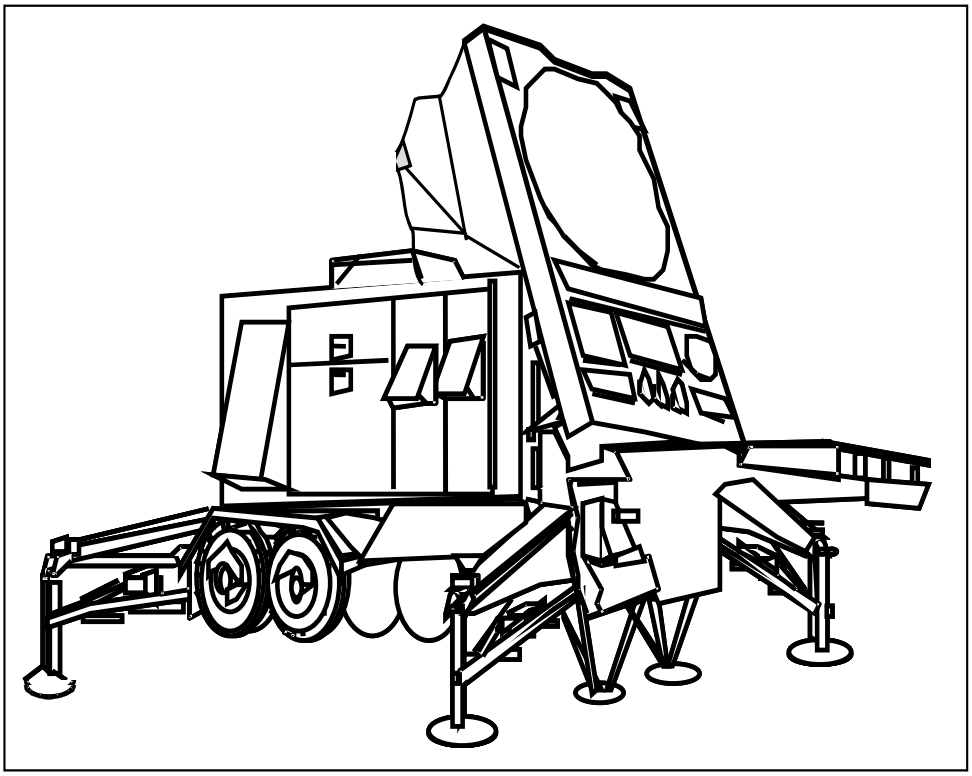


**Figure B-7. Radar Set**

## LAUNCHING STATION

B-22. Launching stations (LS) shown in Figure B-8 are a remotely operated, fully self-contained unit, that has integral onboard power and carries up to four PAC-2 or GEM missiles, or 16 PAC-3 missiles. PAC-2 and GEM missiles may be mixed together on the LS. PAC-3 cannot be mixed with any other type of missiles due to their size. Operation is controlled in the ECS via fiber optics or VHF data link. The LS is mounted on an M-860 semi-trailer towed by an M983 HEMTT. Leveling equipment permits LS emplacement on slopes of up to 10°. The LS is trainable in azimuth ±110° and elevates to a fixed, elevated, launch position. The LS has to be precisely emplaced and aligned prior to launch. Proper emplacement and alignment is critical for engagement of any threat.

B-23. The generator for the LS is located on the yoke assembly of the trailer and includes a built-in 56.8-liter (15-gallon) fuel tank. It has side-mounted work platforms. The unit is a diesel engine-driven generator, 15-kw, four-wire, 400-hertz, 120/208-volt power.

B-24. An M983 is the prime mover for the launching station. Each prime mover should include one radio per launcher. FM communications is required with the ECS and the battery command network during emplacement, missile reload, movement, and static operations.

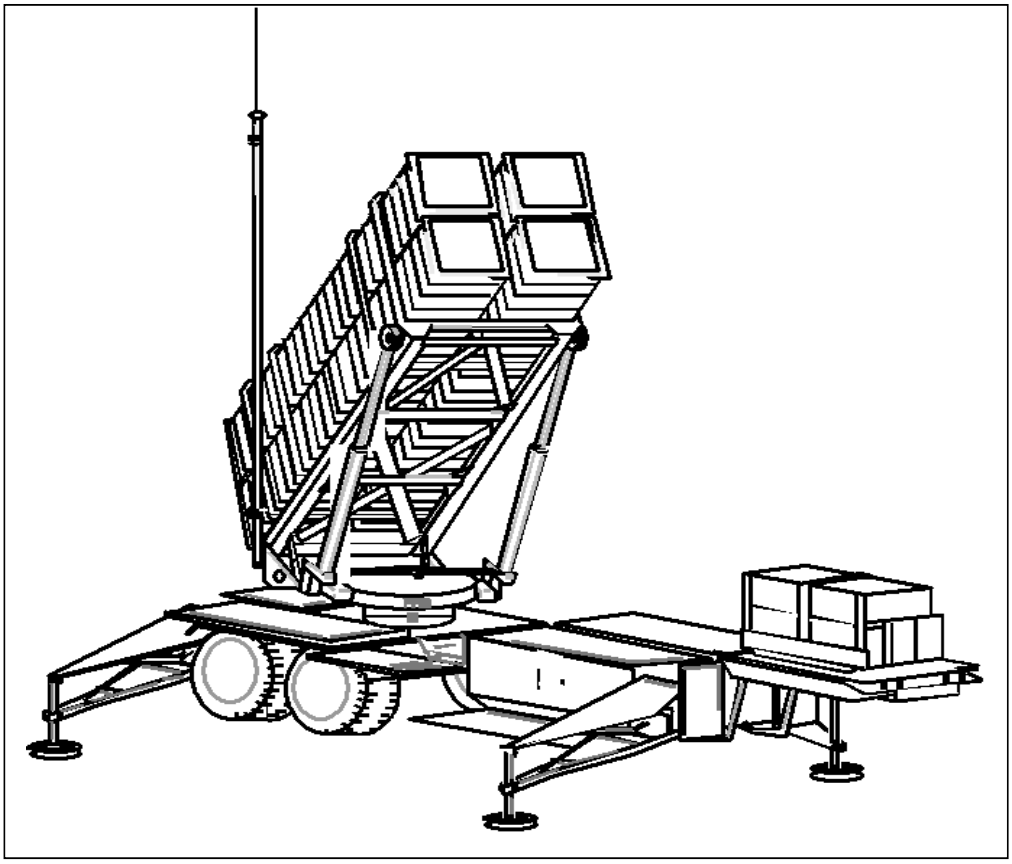


**Figure B-8. PAC-2 Launching Station, Emplaced**

**PAC-3 LAUNCHER**

B-25. The current Patriot launcher has been modified to accommodate the new PAC-3 missile and serves as an interchangeable launcher platform. The upgraded launcher is referred to as a PAC-3 launcher and is capable of accommodating the PAC-3 missile or the current inventory of Patriot missiles. A PAC-3 launcher is shown in Figure B-9.

B-26. Each PAC-3 launcher will include the enhanced launcher electronics system (ELES), a junction box containing a Launching Station Diagnostic Unit (LSDU), and new interface and umbilical cables for the PAC-3 missile. The ELES performs the electrical interface functions between the PAC-3 launcher and the PAC-3 missiles to the ECS through the fiber optics cable or SINCGARS VHF radio. During operations, the ELES may be connected to 16 PAC-3 missiles or four PAC-2 missiles. The ELES is comprised of the launch control unit, motor control unit, power control unit, connector interface panel, and junction box (J-box). The J-box interfaces the ELES and missile

canisters, either PAC-2 or PAC-3 missiles. There is no mixing of PAC-3 and PAC-2 missiles on the same launcher.

B-27. The ELES replaces the launcher electronics module (LEM) and occupies the same location on the launcher. The power distribution unit (PDU) internal to the LEM was replaced with a PCU (internal to the ELES) for control of additional power supplies required by the PAC-3 missile functions. The J-box replaces the launcher missile round distributor (LMRD) on PAC-3 launchers.

B-28. Since the PAC-3 launcher is capable of firing the PAC-3 missile or any standard PAC-2 Patriot missile (STD, SOJC, ATM, or GEM), the launcher must be loaded with all PAC-3 or any combination of PAC-2 missiles, there is no mixing of PAC-3 and PAC-2 missiles on the same launcher.

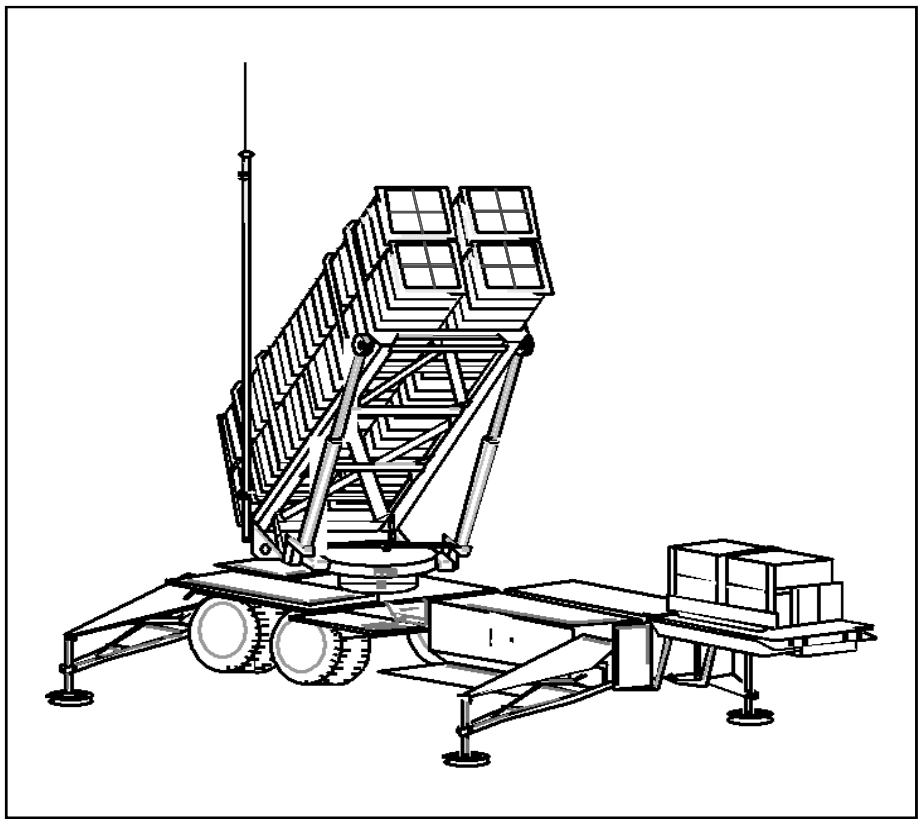


**Figure B-9. PAC-3 Launching Station Emplaced**

## ELECTRIC POWER PLANT III

B-29. The electric power plant (EPP III) shown in Figure B-10 is the prime power source for the ECS and RS. Each EPP consists of two 150-kw, 400-Hz diesel engines that are interconnected through the power distribution unit (PDU) and are mounted on a 10-ton M977 HEMTT. Each EPP contains two interconnected 75-gallon fuel tanks and a fuel distribution assembly with grounding equipment. Each diesel engine can operate more than eight hours with a full fuel tank.

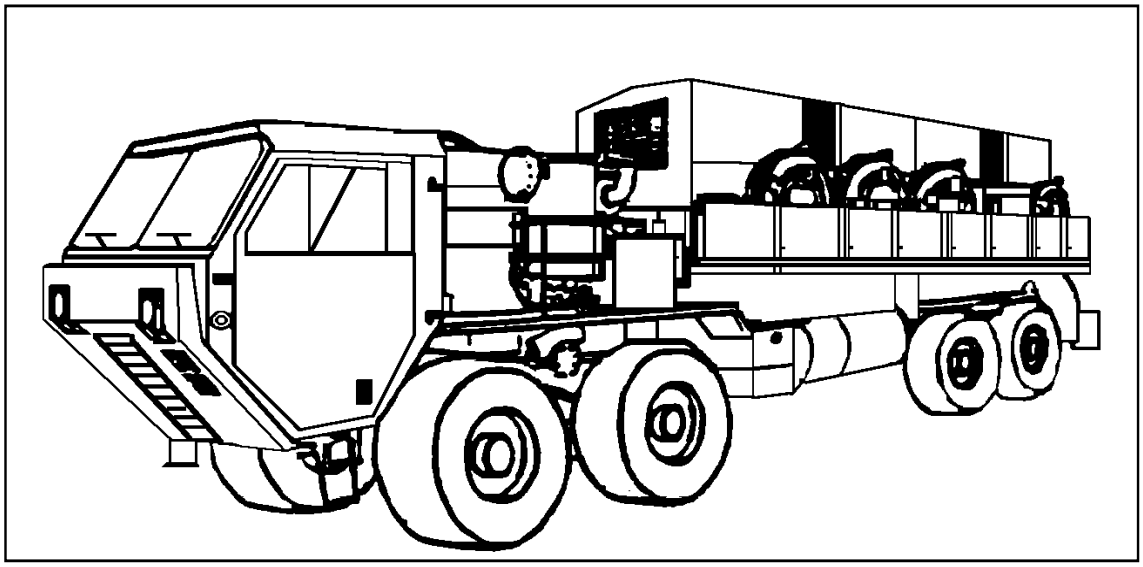


**Figure B-10. Electric Power Plant III**

## ANTENNA MAST GROUP

B-30. The AMG as illustrated in Figure B-11 is a mobile antenna mast system used to carry the amplifiers and antennas associated with the UHF communications equipment located in the ECS, ICC, and CRG. Four antennas are mounted in two pairs, are remotely controlled in azimuth, and can be elevated to heights up to 100 feet, 11 inches, above ground level.

B-31. Emplacement consists of stabilizing the AMG, setting the antenna feed, and the erection of the antennas by the use of self-contained hydraulic and pneumatic systems and then adjusting the antenna elevation. The emplacement slope for the AMG should not be more than 10 degrees for cross-roll and ½ degree for roll. Connecting cables to the collocated shelter is carried on the AMG and includes RF cables, control cables, and a prime power cable.

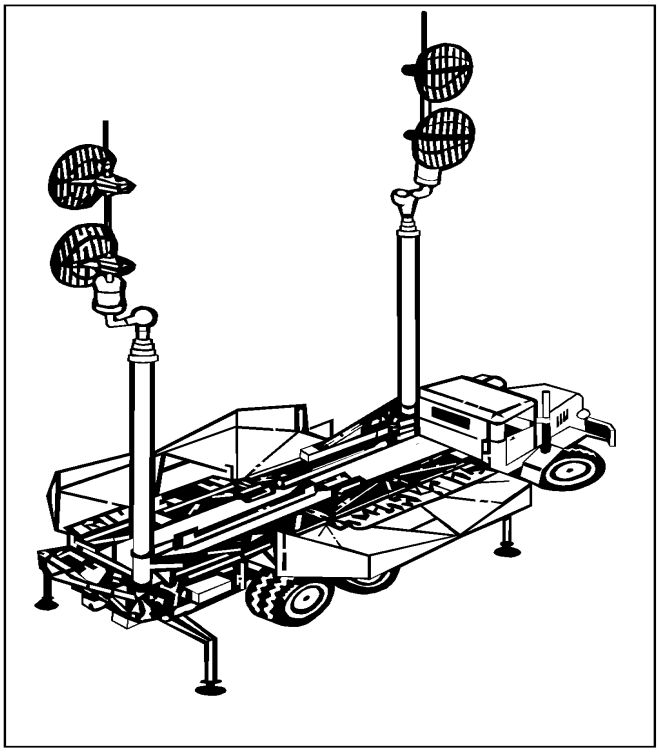
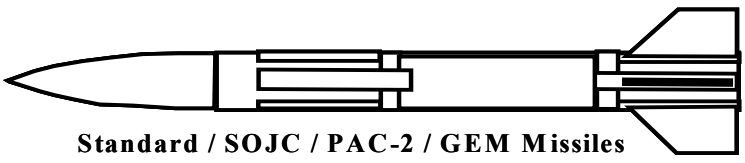


**Figure B-11. Antenna Mast Group**

## PATRIOT MISSILE

B-32. The Patriot missile is a certified round that requires no checkout prior to launch. It is shipped in a canister, which also serves as a launching tube. There are several versions of Patriot missiles, each with different capabilities in Table B-1.

B-33. The PAC-3 missile is considerably smaller than the other Patriot missiles, allowing 16 to be loaded on the launching station vice four of the others. Because the different versions have different capabilities and limitations, there are strict guidelines regarding their selection and use against different threats (see ST-44-85-3). See Figure B-12 for difference between missiles.



**Standard / SOJC / PAC-2 / GEM Missiles**

**PAC-3 Missile**

**Figure B-12. Patriot Missiles**

**Table B-1. Patriot Missiles Dimensions and Weights**

| MISSILE VERSION | CAPABILITIES | DIMENSIONS AND WEIGHTS | | |
|---|---|---|---|---|
| | | LENGTH | DIAMETER | WEIGHT |
| STANDARD | • Basic Capability vs. Aircraft<br>• Limited Effectiveness/ Lethality vs. Scud-Class TBMs And SOJ ECM Threats | 5.3 M | 41 CM | 914 KG |
| SOJC | • Improved Effectiveness Against SOJ ECM Threat | 5.3 M | 41 CM | 914 KG |
| ATM (PAC-2) | • Improved TBM Capability | 5.3 M | 41 CM | 914 KG |
| ATM-1 (GEM) | • Improved Acquisition, Guidance And Fusing<br>• Improved Pk Against Low RCS, High Speed TBMs<br>• Increased Defended Area And Lethality | 5.3 M | 41 CM | 900 KG |
| ATM-2 (PAC-3) | • Improved Maneuverability<br>• Hit To Kill System<br>• Increased Firepower (16 Vs. 4) Missiles Per Launcher | 5.2 M | 25 CM | 312 KG |

### Patriot Support Equipment

B-34. Patriot support equipment consists of standard Army vehicles that have been modified and equipped for use with the Patriot system. They function as the maintenance and supply centers required for Patriot tactical equipment at the battery and battalion headquarters levels. Patriot support equipment is shown in Figure B-13. Repair parts, maintainer tools, test and handling equipment, publications, and maintenance and supply records are stored in the vehicles.

B-35. A maintenance center (MC) is a semi-trailer mounted shop van that contains the tools, test and handling equipment necessary to maintain the Patriot system. It is used at battery and battalion levels. The HHB MC has been configured to function as a small repair parts transporter (SRPT). Power is provided by a PU-732M 15-kw, 400-hz, diesel generator set, trailer mounted. It is towed by a separate vehicle and provides power for the maintenance center and SRPT.

B-36. A guided missile transporter (GMT) is a modified HEMTT M985. The GMT is used for delivery, recovery, loading, and reloading of Patriot missiles. A heavy-duty materiel-handling crane is attached at the rear of the vehicle.

B-37. A large repair parts transporter (LRPT) provides a means to transport and store large, heavy repair parts. It consists of a HEMTT M977 cargo truck with a heavy-duty materiel-handling crane.

B-38. A small repair parts transporter (SRPT) provides a means to transport small, repair parts, and assemblies. It is also used as a maintenance van when needed.

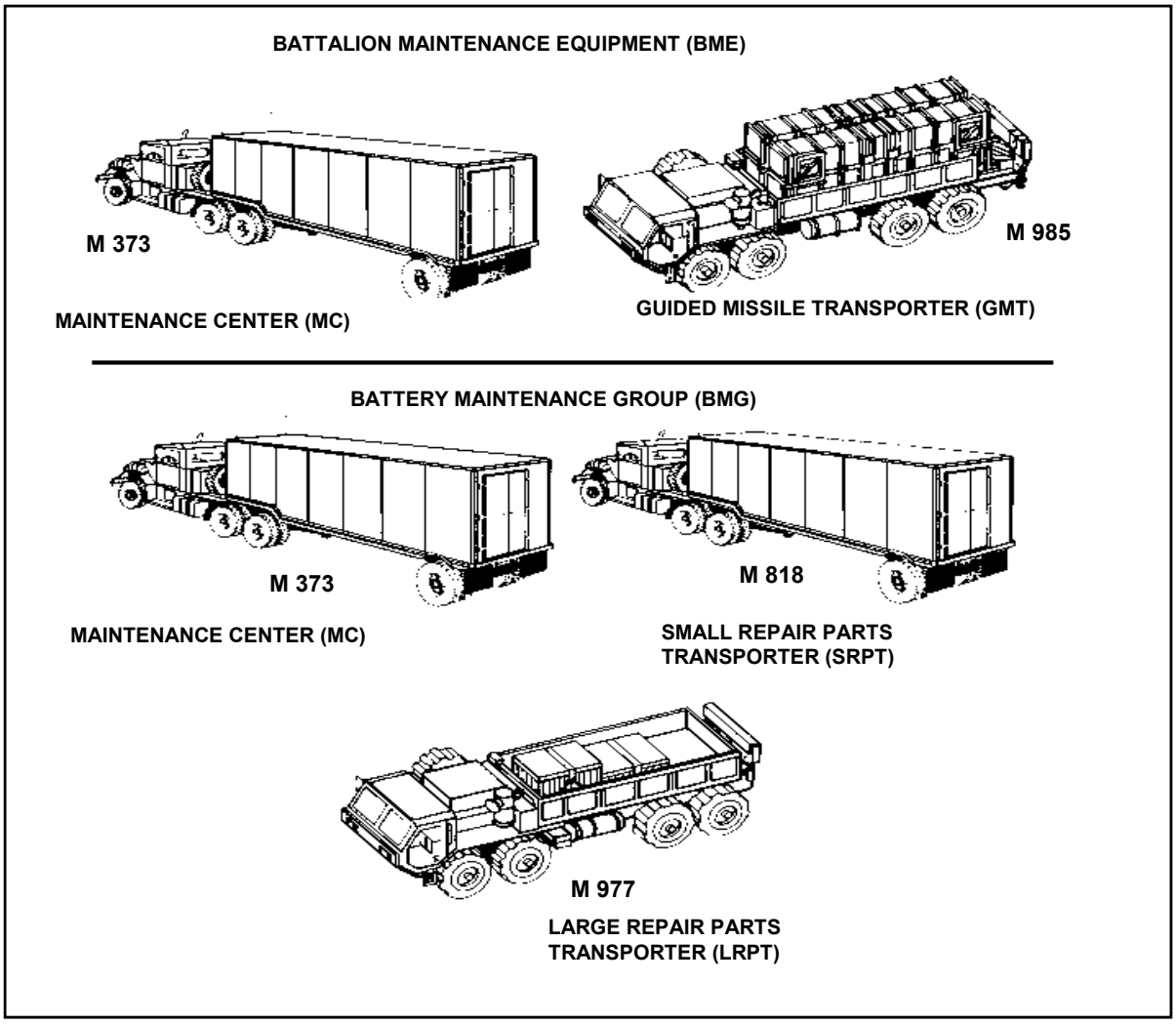



**Figure B-13. Patriot Support Equipment**

## TACTICAL EQUIPMENT WEIGHTS AND DIMENSIONS

B-39. Table B-2 provides approximate weights and dimensions of tactical equipment in both English and metric systems. This table also includes the weight of water and fuel.

**Table B-2. Patriot Equipment Weights and Dimensions**

| EQUIPMENT | MAXIMUM WEIGHT | MAXIMUM OVERALL DIMENSIONS | | |
|---|---|---|---|---|
| | | HEIGHT | WIDTH | LENGTH |
| Radar Set w/ M983 - Prime Mover (AN/MPQ -53) | 78,230 lb<br>35,485 kg | 11.83 ft<br>3.61 m | 9.52 ft<br>2.90 m | 55.77 ft<br>17.00 m |
| Radar Set w/M983 – Prime Mover (AN/MPQ-65) | 78,030 lb<br>35,485 kg | 11.83 ft<br>3.61 m | 9.52 ft<br>2.90 m | 55.77 ft<br>17.00 m |
| Engagement Control Station mounted (AN/MSQ-104) w/M927 5-Ton Tractor Truck w/o Winch | 37,780 lb<br>17,137 kg | 11.92 ft<br>3.63 m | 8.95 ft<br>2.73 m | 32.10 ft<br>9.78 m |
| Electric Power Plant III mounted on M977 Tractor w/Winch | 59,910 lb<br>27,174 kg | 11.25 ft<br>3.43 m | 8.5 ft<br>2.59 m | 33.4 ft<br>10.18 m |
| Antenna Mast Group, OE-MRC w/M942, 5-Ton Tractor w/Winch | 37,170 lb<br>16,860 kg | 1.75 ft<br>3.58 m | 8.26 ft<br>2.52 m | 35.13 ft<br>10.71 m |
| Launcher Station, Guided Missile w/15-kw GEN, w/M983 Tractor and Trailer, No Missiles | 67,010 lb<br>30,395 kg | 11.50 ft<br>3.50 m | 9.42 ft<br>2.87 m | 55.96 ft<br>17.06 m |
| Launcher Station, Guided Missile, w/15-kw GEN w/M983 Tractor and Trailer w/4 GM (PAC-2) Missiles | 82,010 lb<br>37,199 kg | 13.08 ft<br>3.99 m | 9.42 ft<br>2.87 m | 55.96 ft<br>17.06 m |
| 4 GM (PAC-2) w/Canisters, No Truck, No Trailer | 15,000 lb<br>6,804 kg | 6.50 ft<br>1.98 m | 7.04 ft<br>2.15 m | 20.0 ft<br>6.10 m |
| PAC-3 Launcher Trailer Set, w/o Prime Mover, w/15kw GEN, No Missiles | 35,000 lb<br>15,876 kg | 11.50 ft<br>3.50 m | 9.42 ft<br>2.87 m | 33.66 ft<br>10.26 m |
| 4 GM (PAC-3) w/Canister, 16 Missiles Total, No Truck, No Trailer | 18,552 lb<br>8,415 kg | 6.50 ft<br>1.98 m | 7.04 ft<br>2.15 m | 20.0 ft<br>6.10 m |
| PAC-3 Launcher Station, w/o Prime Mover, w/15kw GEN, w/4 GM (PAC-3) w/Canister, 16 Missile Total | 53,552 lb<br>24,291 kg | 13.08 ft<br>3.99 m | 9.42 ft<br>2.87 m | 33.66 ft<br>10.26 m |
| Electric Power Unit II PU 804, Trailer Mounted, No Tractor, Full w/Fuel | 5,920 lb<br>2,685 kg | 7.00 ft<br>2.13 m | 7.92 ft<br>2.41 m | 13.75 ft<br>4.19 m |
| Maintenance Center (MC) w/M932 Tractor | 40,680 lb<br>18,452 kg | 11.42 ft<br>3.48 m | 8.17 ft<br>2.49 m | 46.07 ft<br>14.04 m |
| Small Repair Parts Transporter (SRPT) w/5-Ton M932 Tractor | 39,390 lb<br>17,867 kg | 11.42 ft<br>3.48 m | 8.17 ft<br>2.49 m | 46.07 ft<br>14.04 m |
| Large Repair Parts Transporter (LRPT) w/Light Duty MHE Crane, w/M977 Tractor w/ Winch Assem. (PLL parts not included) | 40,241 lb<br>18,253 kg | 11.92 ft<br>3.63 m | 8.44 ft<br>2.57 m | 33.42 ft<br>10.19 m |

**Table B-2. Patriot Equipment Weights and Dimensions con't**

| | | | | |
|---|---|---|---|---|
| Guided Missile Transporter Truck w/Heavy Duty Crane, No Missiles, M985E1 Tractor and Trailer w/Winch | 41,090 lb<br>18,638 kg | 6.08 ft<br>1.85 m | 8.44 ft<br>2.57 m | 35.73 ft<br>10.89 m |
| Information and Coordination Central, AN/MSQ-16, w/M928 5-Ton, Tractor w/o Winch assem. | 37,000 lb<br>16,783 kg | 11.99 ft<br>3.66 m | 8.54 ft<br>2.60 m | 32.08 ft<br>9.78 m |
| Communications Relay Group (CRG), AN/MRC-137, w/M927 5-Ton, Tractor w/o Winch assem. | 34,690 lb<br>15,735 kg | 11.99 ft<br>3.66 m | 8.54 ft<br>2.60 m | 32.08 ft<br>9.78 m |
| Tactical Command System, AN/MSQ 129, w/M934A1 Tractor | 29,280 lb<br>13,309 kg | 11.86 ft<br>3.61 m | 8.17 ft<br>2.49 m | 30.22 ft<br>9.21 m |
| Heavy Expanded Mobility Tactical Trk (HEMTT), 10 Ton, M983 | 32,880 lb<br>14,914 kg | 9.25 ft<br>2.82 m | 8.46 ft<br>2.58 m | 29.29 ft<br>8.93 m |
| Heavy Expanded Mobility Tactical Trk (HEMTT), 10 Ton, M983 Fuel-Empty-2500 gal. | 38,165 lb<br>17,311 kg | 9.25 ft<br>2.82 m | 8.46 ft<br>2.58 m | 33.4 ft<br>10.18 m |
| Heavy Expanded Mobility Tactical Trk (HEMTT), 10 Ton, M984A1 Wrecker | 50,900 lb<br>23,088 kg | 9.25 ft<br>2.82 m | 8.46 ft<br>2.58 m | 32.7 ft<br>9.97 m |
| Electric Power Plant (EPP) III Vehicle Mounted on M977 Tractor w/Winch, | 52,910 lb<br>24,000 kg | 11.25 ft<br>3.43 m | 8.5 ft<br>2.59 m | 33.40 ft<br>10.18 m |
| JP-8 Fuel (1 gal) | 6.7 lbs<br>3.04 kg | | | |
| Water (1 gal) | 8.0 lbs<br>3.63 kg | | | |

## Appendix C

# Communications

This appendix provides an overview of Patriot communications doctrine and the supporting $C^4I$ resources that must be considered in communications planning activities. The Patriot system relies heavily on internal and external data and voice communications. For more detailed information, see FM 3-01.87.

## OVERVIEW

C-1. The Patriot communications architecture allows Patriot to integrate with Army, joint, and allied $C^4I$ systems in both mature and immature theaters. In a mature theater, Patriot normally integrates as part of an Army air defense brigade at EAC or corps, and may be required to fight in an air and missile defense task force (AMDTF) that includes THAAD and other Army, joint, or multinational systems. In an immature theater, Patriot battalions or batteries may fight in a TF with THAAD as part of an air defense brigade (Patriot batteries may fight without a battalion) or may be required to electronically integrate with joint or allied $C^4I$ systems depending on METT-TC circumstances. Figure C-1 shows the basic communication links for Patriot. Note: Depending on the units capabilities communication links may also include TIBS, TRAP, TDDS, IBS, TADIL-A, and voice and etcetera.

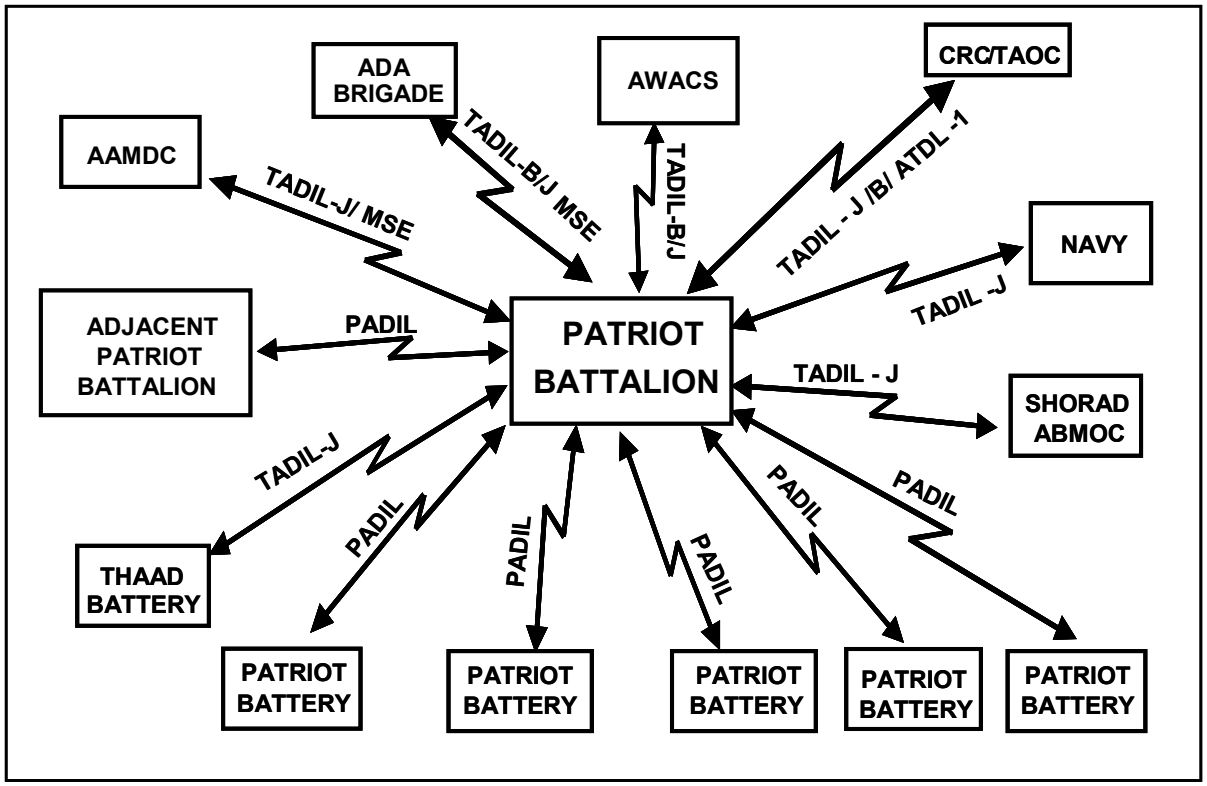



**Figure C-1. Patriot Communications Overview**

## BATTALION COMMUNICATIONS

C-2. The Patriot battalion communications networks must provide reliable, real time or near real time exchange of information between dispersed Patriot batteries, higher headquarters, adjacent battalions, and supported units. The communications system must be redundant to provide continuous communications even when the primary system fails. To effectively accomplish the mission, the Patriot battalion must maintain communications that will support—

- Control of the air battle.
- Command, administrative, and logistical communications with higher headquarters, subordinate units, and lateral units.
- Liaison with supported units or the units in whose area the Patriot battalion is operating.

C-3. The Patriot battalion commander is responsible for establishing effective communications. He exercises $C^2$ of organic signal assets through his signal officer. The doctrinal responsibilities for establishing communications are from higher to lower, left to right, and supporting to supported. The battalion uses organic multichannel radio and local wire nets to provide external and internal communications. An organic communications platoon provides multichannel UHF and range extension for the battalion and limited support to the FUs.

## EXTERNAL COMMUNICATIONS

C-4. External communications are established with the ADA brigade and adjacent Patriot battalions. The battalion is also capable of communicating with a CRC/TAOC, AWACS, AAMDC, Navy, ADA brigade, and SHORAD battalions.

C-5. Patriot communications provide a capability to communicate with weapon, intelligence, and communications systems external to the battalion. There are two major elements to the communications capabilities. These capabilities provide interservice interoperability for Patriot. The first major element provides Patriot battalions with direct access to tactical digital information link TADIL-A, TADIL-B, and TADIL-J networks through upgrade of the routing logic radio interface unit (RLRIU) and addition of radios. The second major element provides interoperability with the ACUS, which is composed of mobile subscriber equipment (MSE) at corps and below, and of Tri-Services Tactical Communications (TRITAC) equipment at echelons above corps. Intelligence data is received over the Tactical Information Broadcast System (TIBS) on the Commander's Tactical Terminal−Hybrid Receiver (CTT/H-R) unit. The data is forwarded to the ICC and tactical planner workstation.

### ADA Brigade

C-6. Communications with the ADA brigade supports air battle $C^2$. It also facilitates administrative, logistical, operational, and intelligence functions. The brigade commander is responsible for establishing voice and data link communications and for providing an ACUS gateway to the MSE network. The connectivity supports voice, and data communications between brigade and the Patriot battalion.

C-7. The brigade maintains a multichannel system between the brigade and subordinate Patriot, THAAD, and SHORAD battalions. The corps ADA brigade is supported by the corps signal brigade, normally with an MSE SEN at brigade headquarters and required resources at the Patriot battalion location. Because the MSEs capability is extremely limited the SEN should be collocated with the battalion TOC.

### Adjacent Patriot Battalions

C-8. A Patriot battalion normally establishes UHF multichannel communications with an adjacent Patriot battalion using one of the four links of a CRG. Adjacent battalions exchange engagement operations information using the Patriot digital information link (PADIL) at a data exchange rate of 256 or 512 bits per second over the AN GRC 103 radio. This data exchange rate is needed to ensure high quality fire control and track coordination.

### Supported Unit

C-9. Patriot battalions establish voice and data communications with the unit in whose area the battalion is operating. The battalion normally coordinates with the ADA brigade or AAMDC on ADA functions and operates in the

Patriot network. The Patriot battalion provides early warning to the supported unit command net.

C-10. Engagement operations communications consist primarily of data communications. However, voice communications complement and supplement data communications. JTIDS is the primary means used for data communications; however, CTT provides linkage to early warning and intelligence networks. MSE and SINCGARS are the primary means for voice communications.

C-11. Force operation communications are essentially the same as used for engagement operations voice. These include—

- TRITAC.
- MSE.
- SINCGARS.

### Supporting Unit

C-12. Supporting units establish communications with the supported unit. Normally, the attached direct support (DS) Patriot maintenance company (MC) collocates with or sends a liaison element to the Patriot battalion headquarters. If this is not feasible, the DS Patriot maintenance company enters the Patriot battalion administrative and logistics net. All other units that provide support to the Patriot battalion on an area basis normally establish communications with the Patriot battalion. This includes the S1 and S4 operations.

## INTERNAL COMMUNICATIONS

C-13. Internal communications are established with each Patriot FU to support force operations and engagement operations functions. Internal communications facilitate control of the air battle, administrative, intelligence, operations, and logistics functions, using both UHF multichannel and VHF-FM nets.

### Multichannel Radio Systems

C-14. Patriot battalions use organic resources to establish multichannel communications with each subordinate battery. To pass real time engagement operations information, automatic data links are established using a multi-routing scheme shown in Figure C-2. If an FU is collocated with the Patriot battalion, it can connect via specialty cable (CX 11230) directly to battalion.

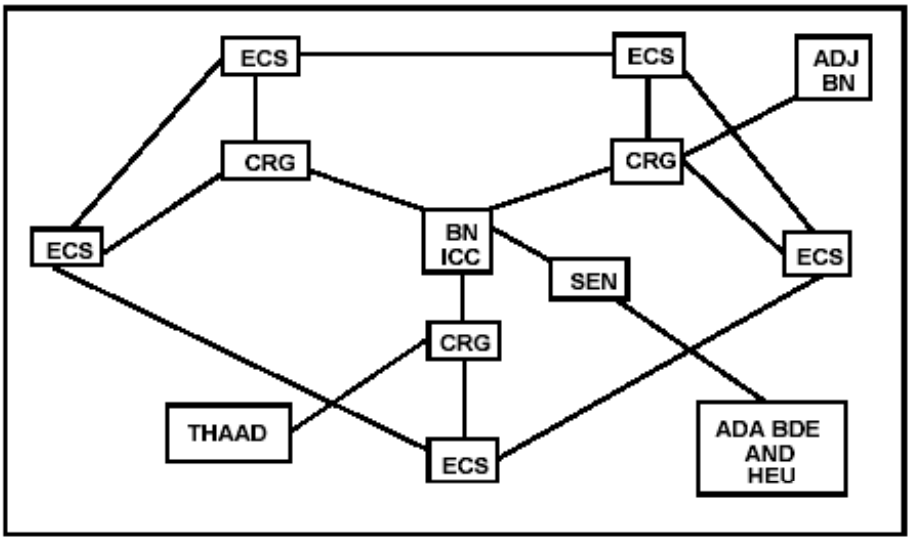



**Figure C-2. Battalion UHF Links**

C-15. Three voice circuits are established over the UHF multichannel network between battalion and batteries. These open circuits allow everyone at each battery and battalion to be simultaneously on line. Each radio is used for the multi-routing of data on the automatic data link circuit PADIL, normally channel 4. An engagement voice circuits established using channel 1, corresponds with party line 1 on the operator's intercom box. Intelligence and radar reporting circuit is established using channel 2 and party line 2 on the Intercom Box. Another circuit is reserved, using channel 3 and party line 3 as a maintenance circuit (not used for control of the air battle). Patriot battery TCAs and battalion TDAs monitor the ADC circuit while the battery TCOs and battalion TDs monitor the higher echelon nets.

C-16. Patriot battery and battalion communications operators use the maintenance net. This circuit is an unsecured channel used to coordinate communications circuits. This circuit is similar to other circuits between the battalion and the ADA brigade.

### Battalion Command FM Net

C-17. The purpose of this net is to provide communications for the command function within the battalion headquarters. The stations operating in the net are shown in Figure C-3. This is used as the primary $C^2$ net during movements and as a secondary net when in a static position.

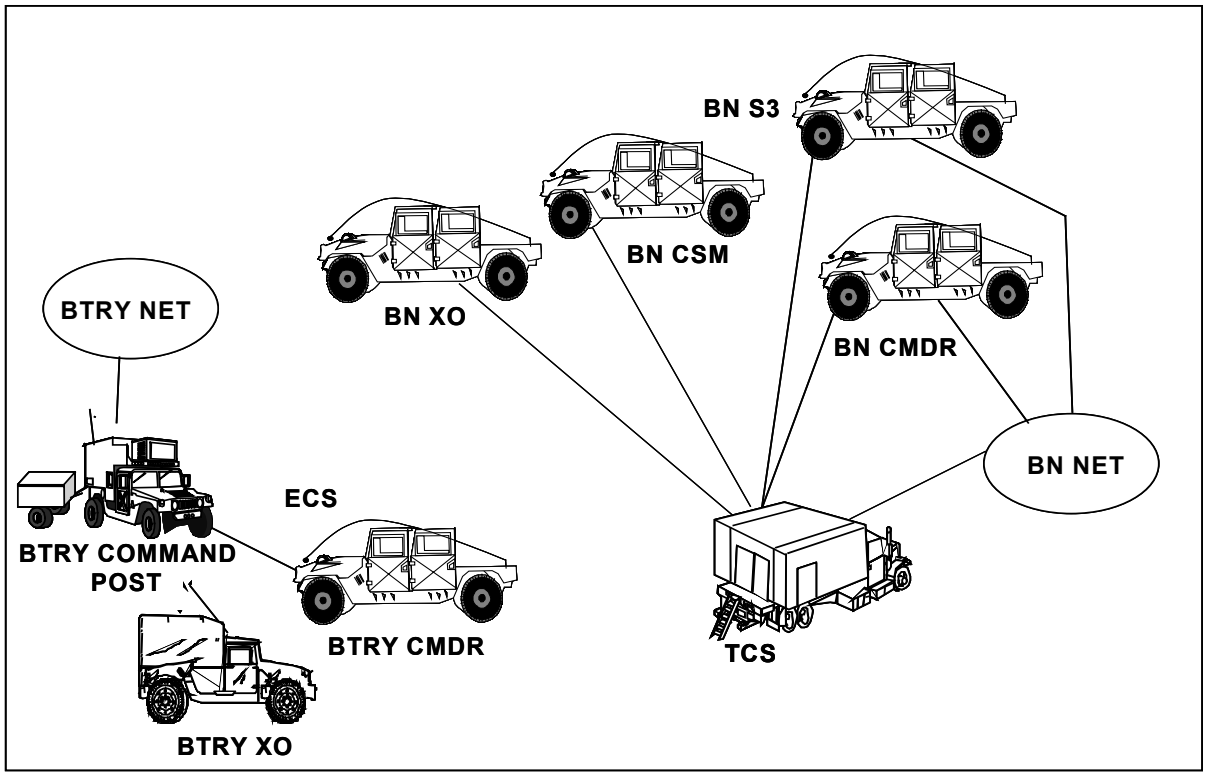



**Figure C-3. Battalion FM Command Network Layout**

### Administration/Logistics, Intelligence, and Operations

C-18. Normally, the UHF multichannel radio system, which provides communications for control of the air battle, also supports other functions. Since the UHF system is operational most of the time, it is also the primary means for the staff to provide $C^2$ of the FU. The number of circuits is limited by the 12 external wire connections at the ICC. These 12 circuits must provide connections to brigade and each battery. Generally, each battery has a minimum of two circuits and will frequently have more. These UHF circuits are connected to switchboards at the battalion and battery.

C-19. The ICC is linked to the battalion TCS and the system maintenance center by a wire network using TA-312s, DNVTs, or LS147s as shown in Figure C-4. This net allows for rapid communications between key elements of the TCS and the ICC. It can be used to cross-tell time-sensitive air battle data such as a change in the airspace control order (ACO). Maintenance support can also be requested without leaving the ICC.

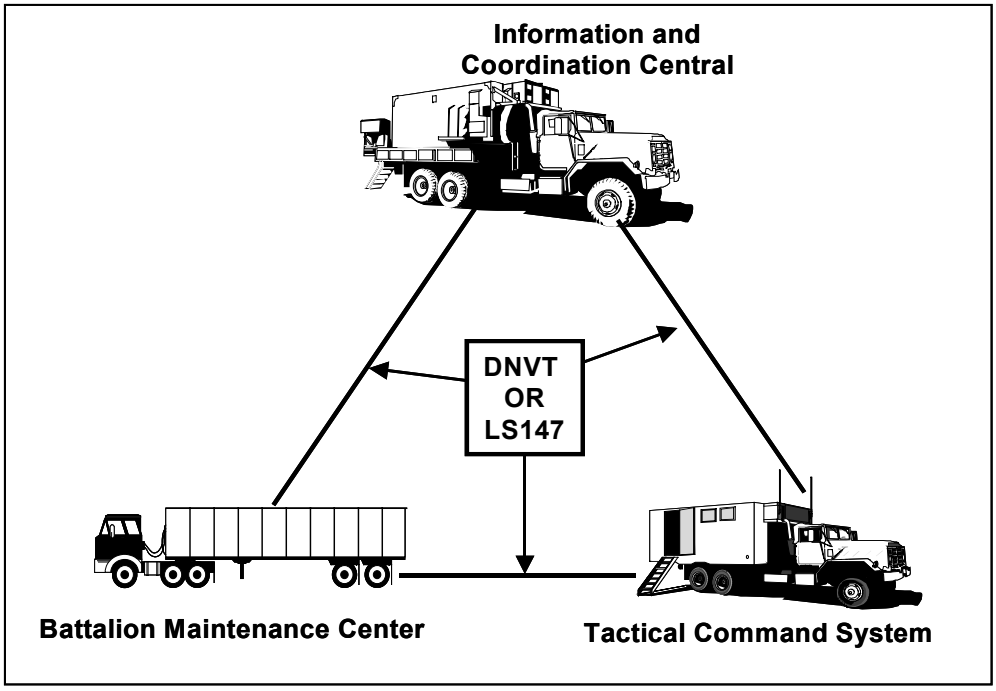



**Figure C-4. Battalion Wire Net**

C-20. The battalion and battery wire net connectivity is shown in Figure C-5. This net is the primary means of communications between battery elements using either DNVTs or LS147 telephones. The switchboard also provides access to a minimum of one circuit to each FU.

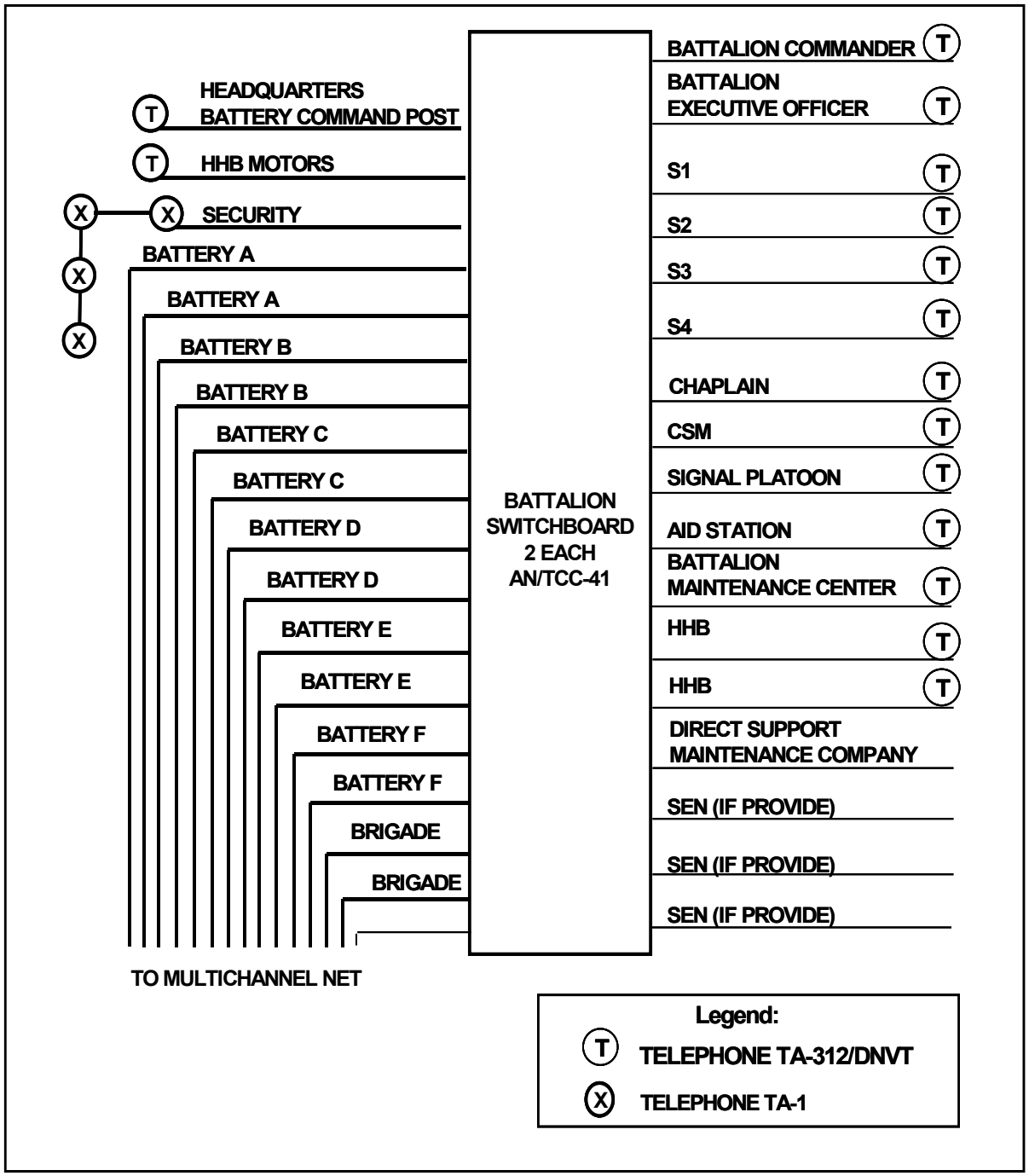



**Figure C-5. Battalion Local Wire Net**

C-21. A voice and data wire link provides administrative and logistics $C^2$ see Figure C-6 for illustration. The net control station is located at the S1 and S4 van. Every station in the net is secure. The net is routed through the CRG with UHF links to higher and supported units.

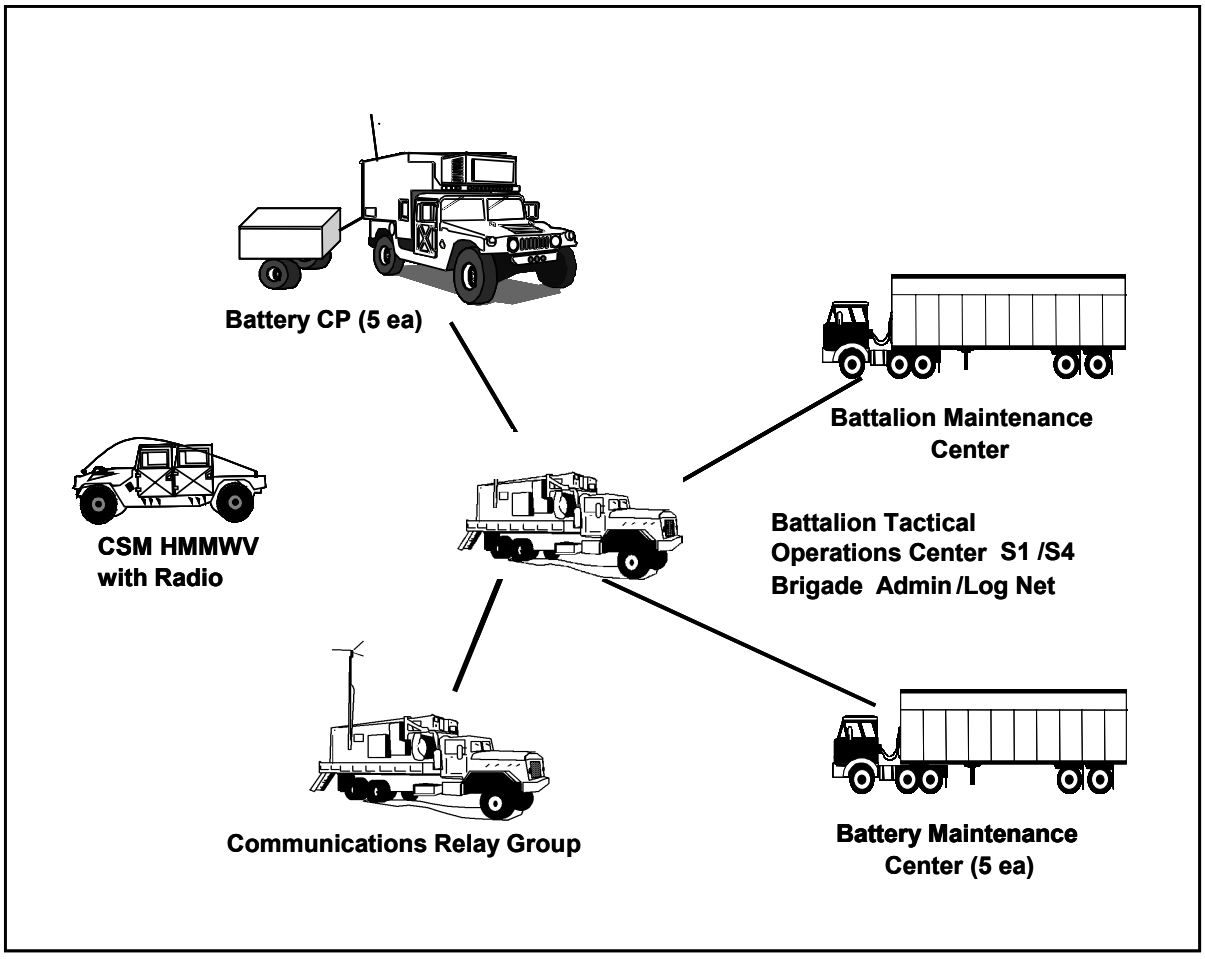



**Figure C-6. Battalion Administrative/Logistics Net**

## BATTERY COMMUNICATIONS

C-22. Patriot battery communications are comprised of three systems: the battery command net, the FU operations net, and the battery data net. These nets are described below.

### BATTERY COMMAND NET

C-23. The battery command net as shown in Figure C-7 is an FM radio net used to exercise $C^2$ of the battery during unit road movements. The 1SG is included in the battery net to help the commander facilitate command and control, during and after movement. The FM radio net also provides backup communications (for FU operations net) after the FU has been emplaced.

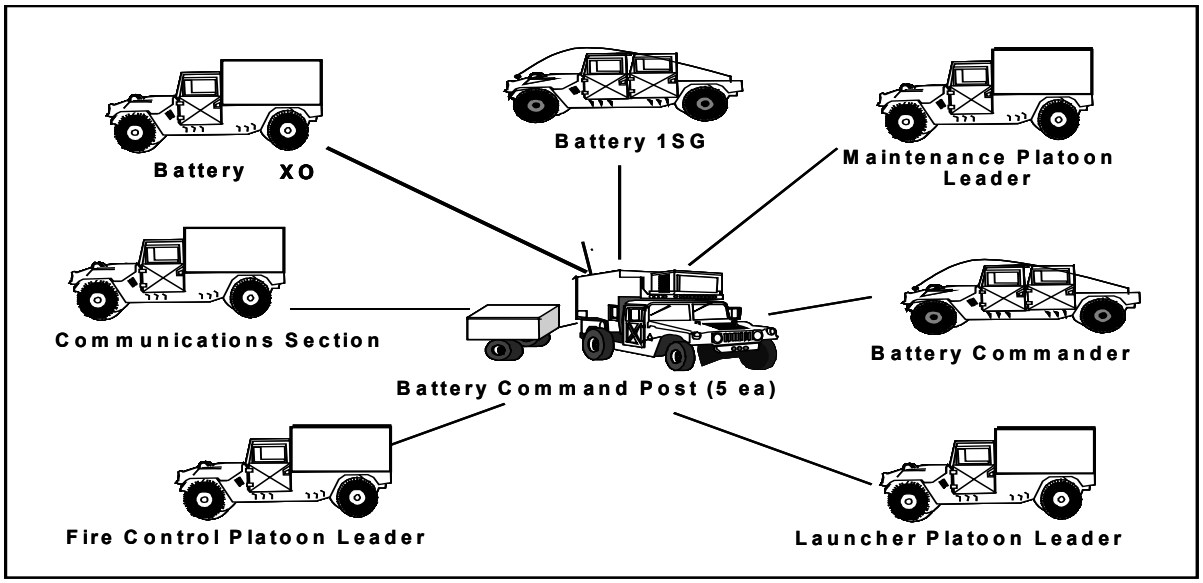



**Figure C-7. Battery Command Net**

## FIRE UNIT OPERATIONS NET

C-24. The FU operations net shown in Figure C-8 is a wire net used to exercise $C^2$ of the FU after it has been emplaced. The net control station for this net is the CP. A switchboard in the CP allows the commander to communicate with the 1SG, ECS, the launcher sections, the communications section, maintenance platoon, supply, and other elements. Switchboard connections are diagrammed in Figure C-9.

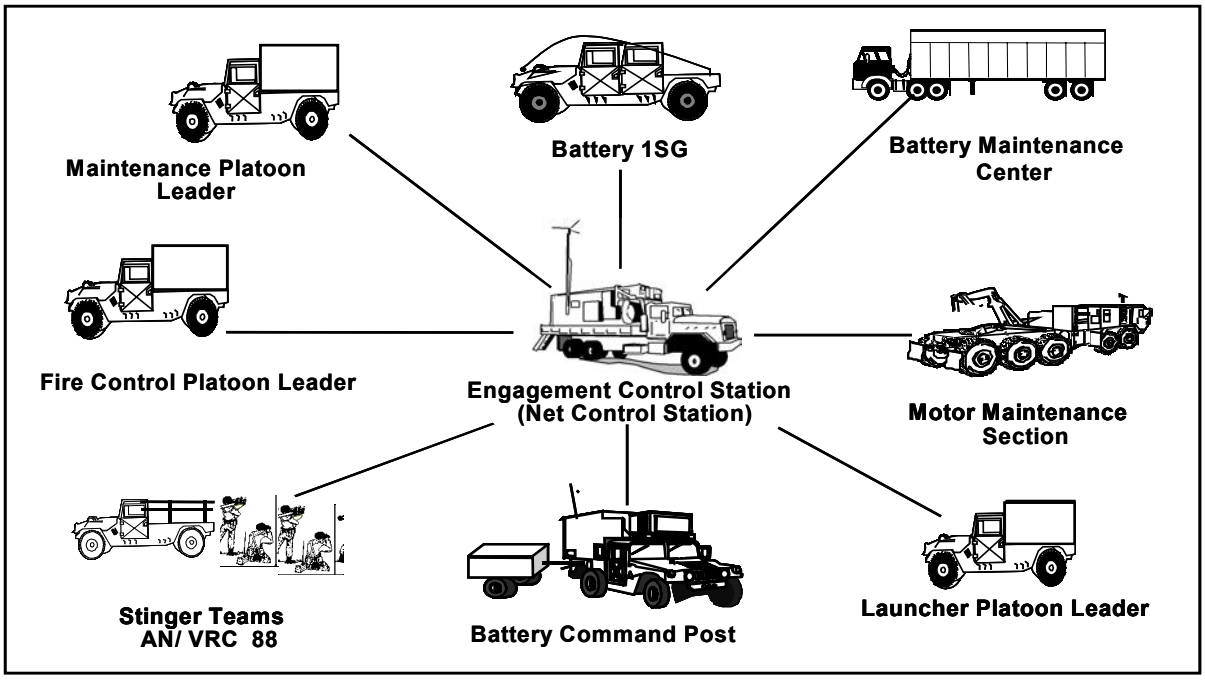



**Figure C-8. Fire Unit Operations Net**

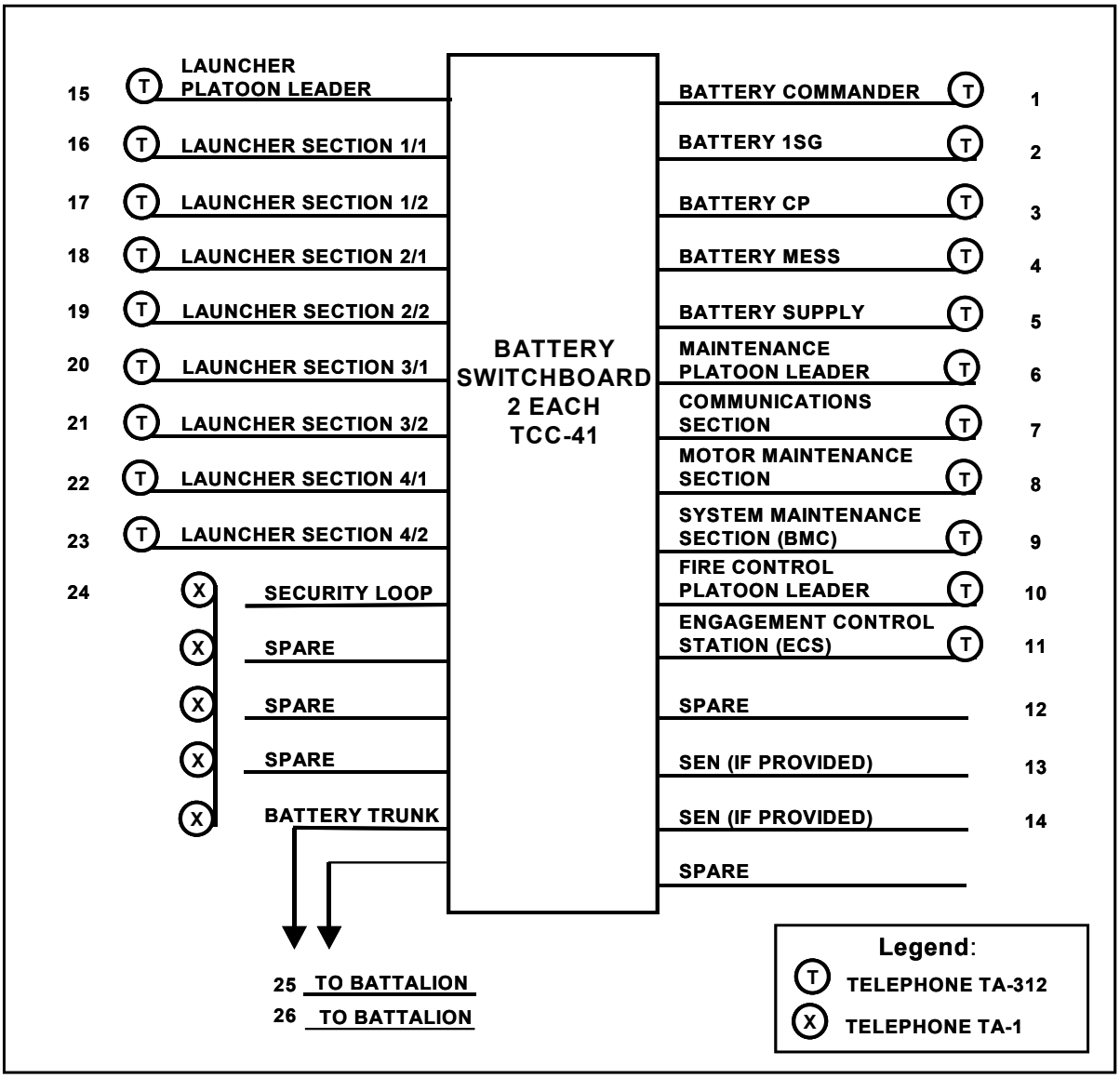



**Figure C-9. Battery Switchboard Connections**

## BATTERY DATA NET

C-25. The data net in Figure C-10 provides connectivity between the ECS and launchers, and is used to launch missiles and establish missile availability and status. Fiber-optic cables link the ECS to the local launching stations. Data radio transmissions are used as backup for local launchers and as primary for remote launchers. The net is controlled at the ECS by special purpose radio equipment that provides reliable transmission of low-data rate messages over a short path. All command messages originate at the ECS, requiring a slaved response from the LS in the form of a status message. The LS cannot originate data communications. This is the first net established during battery emplacement.

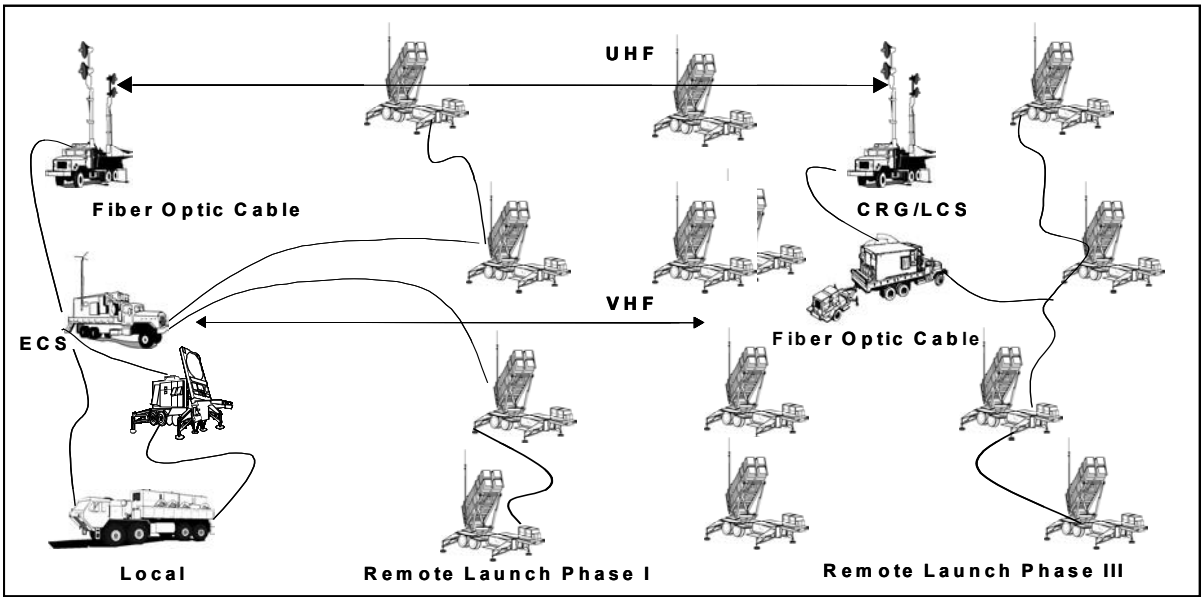



**Figure C-10. Battery Data Net**

## AIR AND MISSILE DEFENSE TASK FORCE COMMUNICATIONS

C-26. The Patriot battalion may be task-organized with THAAD and/or SHORAD units, forming an air and missile task force (AMDTF). The AMDTF uses a variety of communications networks to accomplish its mission. These networks, shown in Figure C-11, include the joint data network (JDN), the joint engagement coordination network (JECN), the joint mission management network (JMMN), and the UHF and other voice nets. The JDN, JECN, and JMMN are JTIDS communications networks that disseminate TADIL-J data messages.

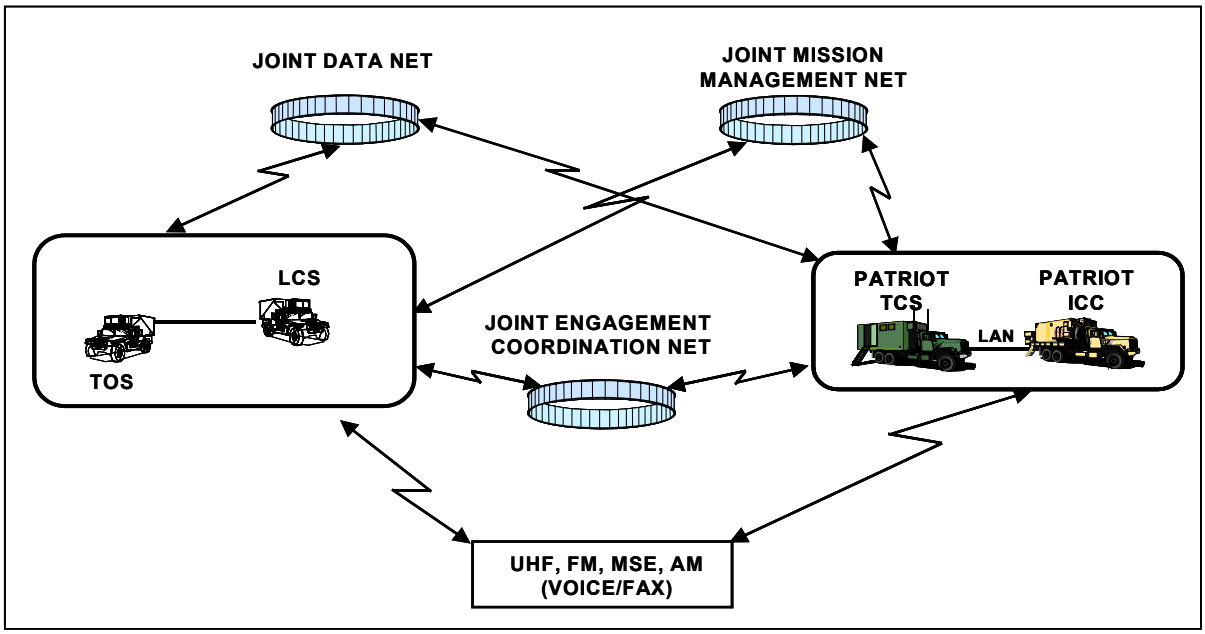


**Figure C-11. AMDTF Communication Networks**

## JOINT DATA NETWORK

C-27. The JDN is used to disseminate near-real time surveillance and precise participant location information (PPLI). It is used by the AMDTF primarily for exchanging air and missile track data. The specific messages used in AMDTF operations are shown in Figure C-12. These messages are associated with network participation groups (NPGs) 6 and 7. (See CJCSM 6120.01B for a discussion of NPGs and TADIL J messages).

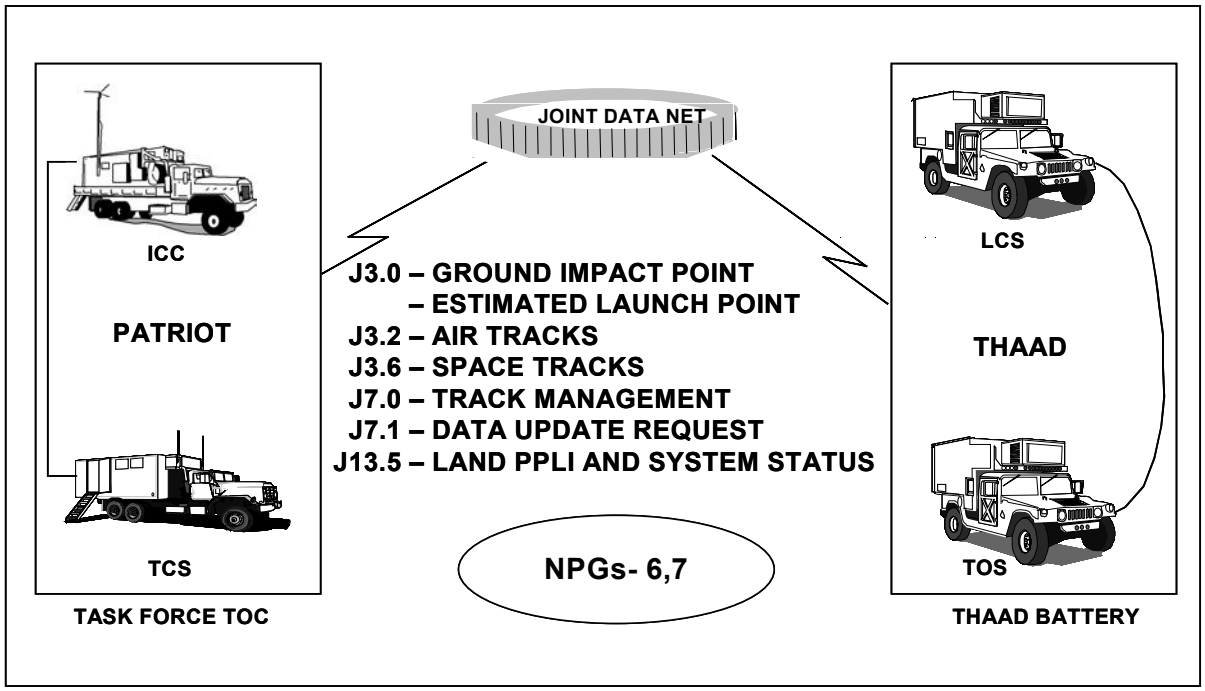



**Figure C-12. Joint Data Net**

## JOINT ENGAGEMENT COORDINATION NETWORK

C-28. The JECN is used to disseminate near-real time engagement coordination information. It is used by the AMDTF primarily to coordinate engagements between Patriot and THAAD. The specific messages used by the AMDTF, shown in Figure C-13, are associated with Patriot external communications.

## JOINT MISSION MANAGEMENT NETWORK

C-29. The JMMN is used to disseminate near-real time mission management information. It is used by the AMDTF and THAAD to disseminate commands, engagement status, and ICC/ECS operational status. It also serves as a $C^2$ link with higher headquarters and joint agencies. Figure C-13 illustrates the joint engagement coordination net.

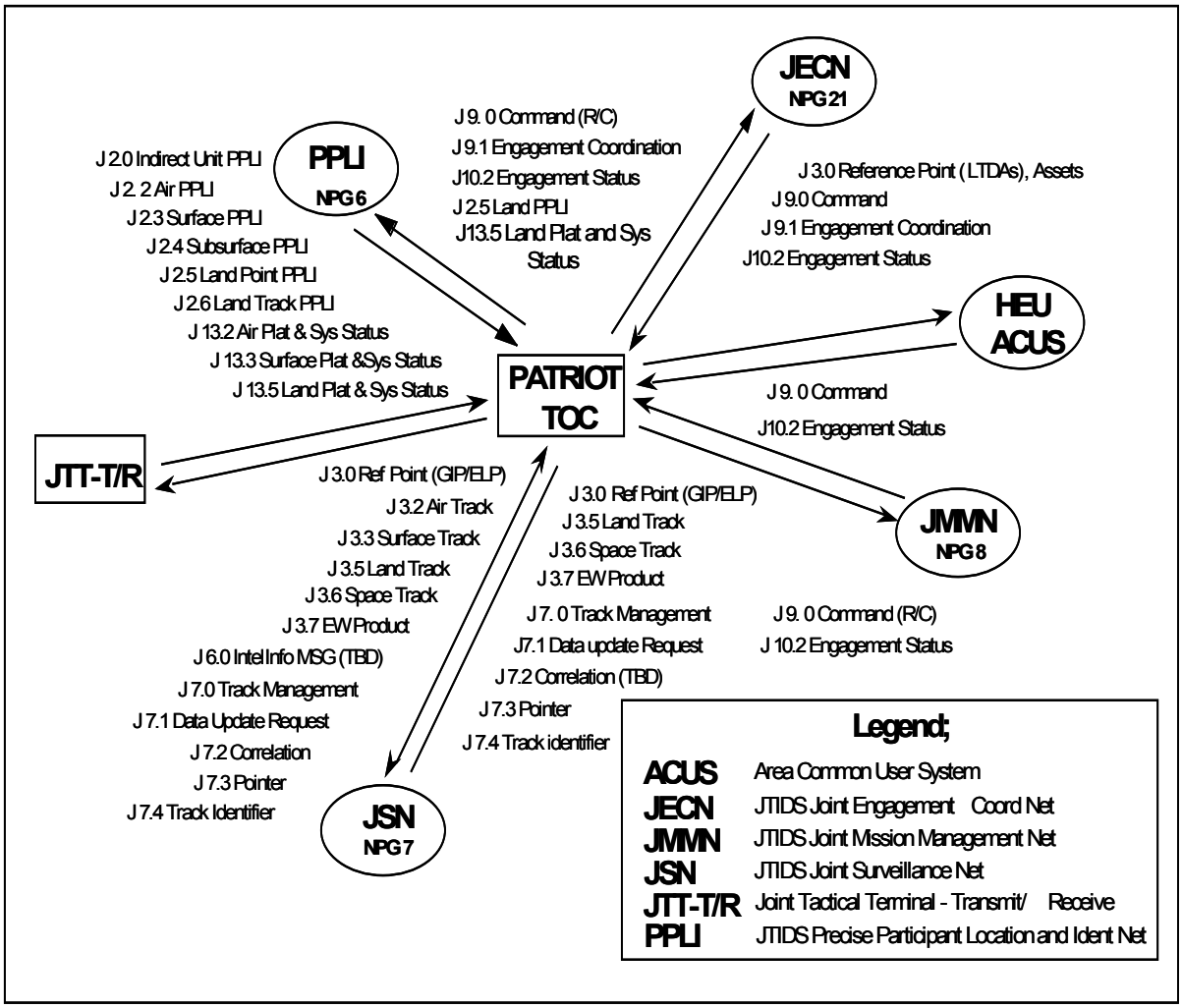



**Figure C-13. Joint Engagement Coordination Net**

## UHF VOICE, ACUS, AND SINCGARS NETS

C-30. The UHF voice net, shown in Figure C-14, provides the primary communications for coordinating AMDTF engagement and force operations activities, including engagement coordination, defense design, firing doctrine, system initialization, and sensor orientation, with task force elements. The area common user system (ACUS) net is also used to coordinate force and engagement operations activities. The single-channel ground and airborne radio system (SINCGARS) net is a FM net used for backup $C^2$ within the AMDTF.

### COMMANDERS TACTICAL TERMINAL/HYBRID

C-31. A commander's tactical terminal hybrid (CTT/H) is installed in the TCS and ICC. The CTT/H is a special purpose receiver that allows Patriot to receive intelligence information from various intelligence sources within theater. The CTT/H allows TIBS data to be displayed in the TCS and ICC for situational awareness and planning purposes.

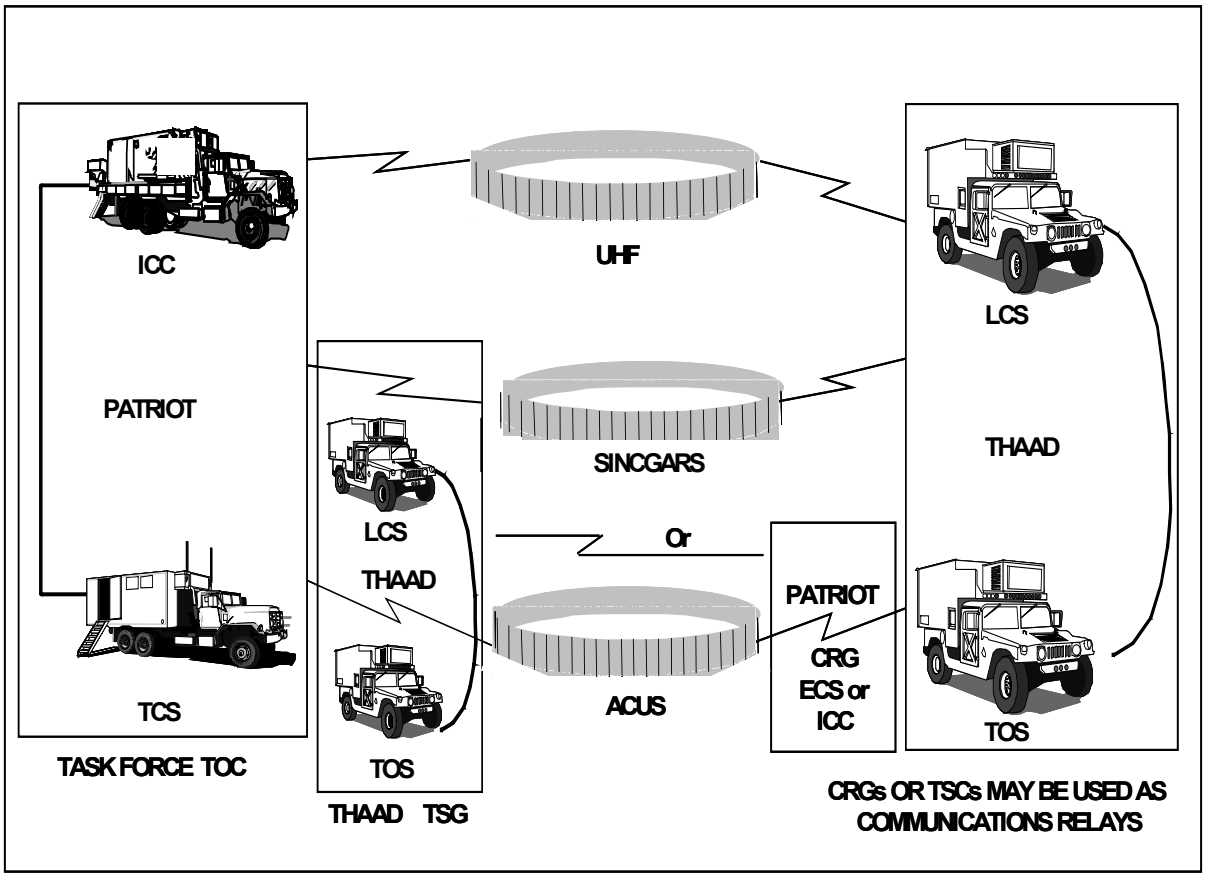



**Figure C-14. MSE and Voice Nets**

## PATRIOT COMMUNICATIONS PLANNING

C-32. Communications planning begins while the fire unit locations are selected to support the defense design. Enhancements with Configuration 3 and PDB-5 software have altered the technical capabilities of Patriot communications, but have not altered the basic method of conducting communications planning. There must be voice and data links created between each fire unit, ICC, CRG, and LCS location.

C-33. Patriot communications consist of AN/GRC-103 UHF, a joint tactical information distribution system (JTIDS) 2M terminal to the ICC, the integrated digital operator control station (IDOCS), RLRIUs, corner

reflectors, LCSs, and AMGs. These items are used to execute the battalion's communications plan.

## PLANNING RESPONSIBILITIES

C-34. The battalion signal officer, in conjunction with the S3, coordinates with brigade staff and adjacent signal officers to develop the communications plan prior to each move. A well-developed communications plan ensures you have communications at new positions.

C-35. The signal officer prepares the communications plan using the signal annex to the TSOP and the SOI. Frequency management personnel can assist in developing several areas of the plan. The following are steps the signal officer must consider as part of the planning process.

- Review operations order from higher echelon, and evaluate the defined area of operations.
- Conduct a ground or map reconnaissance to determine line-of-sight supportability. This analysis can be accomplished using the TCS communications planning function.
- Request pre-approval for possible communications sites based on line-of-sight supportability and availability. These sites will be coordinated with the defense design when determining placement of Patriot units.
- Prepare for publication of signal annex to OPORD–
  - Coordinate with JICO for battalion OPTASK links, and prepare data for tab entries.
  - Coordinate TADIL-J network, load files, and prepare data for tab entries.
  - Request frequency sets from higher for FM, AM, CTT, TADIL-A, TADIL-B, TADIL-J, ATDL-1, and PADIL networks.
  - Coordinate for connectivity to higher echelons, joint, and multinational forces.
  - Prepare network diagrams for voice, data, computer LANs, and multi-TADIL networks. Diagrams must include locations, frequencies, antenna azimuths, relays, and alignment.
  - Plan, develop, and organize communication support organization.
- Prepare for publication of signal annex to OPORD.
- Have at least one dedicated AN/PSC-5 tactical satellite (TACSAT) radio per battalion. SIGO must coordinate for TACSAT COMSEC for employment of TACSAT communications.
- Coordinate for additional signal support with higher headquarters for satellite communications (SATCOM) when LOS and organic communications are not possible.
- Request SOIs for battalion (distribute, maintain control and use of CRYPTO material).
- Ensure there is logistic support for isolated sites (personnel, fuel and rations).
- Monitor all communications links and prepare communication plans for contingency operations.

## PRIMARY CONSIDERATIONS

C-36. When developing the communications plan, the signal officer must consider a number of factors. This list is not exhaustive and will vary depending on the situation.

- Identify all network units interbattalion–total number of Patriot and THAAD FUs, CRGs, and the ICC), interbattalion (adjacent ICCs and subordinate German Hawk operations center), and extrabattalion (brigade TOC elements), and their UTM coordinates. The system can use up to six CRGs.
- Evaluate site terrain for line-of-sight emplacement of antenna mast group (AMG) or corner reflectors. For planning purposes, 40-kilometers are the effective line-of-sight range for AMG in the bypass mode. The planning range for corner reflectors is 10-kilometers.
- Plan for polarization of UHF antennas.
- Define the patching scheme for each battalion element. Assign antenna azimuths for each link.
- Assign battalion identification numbers to generate RLRIU addresses for local battalion elements. The RLRIU address defines the RLRIU that delivers the data block.
- Identify the interbattalion or extrabattalion exit and entry port (ICC or CRGs 1 through 4) and shelter modem (1 through 5) to be used for each interbattalion or extrabattalion link. Direct linking, discussed later, offers an alternative to the use of modems for interbattalion communications.

## PLANNING THE COMMUNICATIONS NETWORK

C-37. Communications network planning requires close coordination between the signal officer and the S3 section. The S3 informs the signal officer of proposed unit locations determined by the defense planning. The signal officer determines the need for CRGs based on the distance between units and the terrain. Once the UTM coordinates of the deployed units are known, the locations are plotted on a map to determine profile elevations and to verify distance between units. Technical data for this is provided in TM 11-5820-540-12. The same information displayed on the notational battalion UHF link diagram in Figure C-15 will be required in the standard five-battery configuration. Pictured below is a three-battery configuration with two CRGs. A five-battery configuration would have additional CRGs with all shot groups correlating with each other and then to the ICC. The diagram should contain the UTM coordinates and elevation data for each ECS, ICC, and CRG.

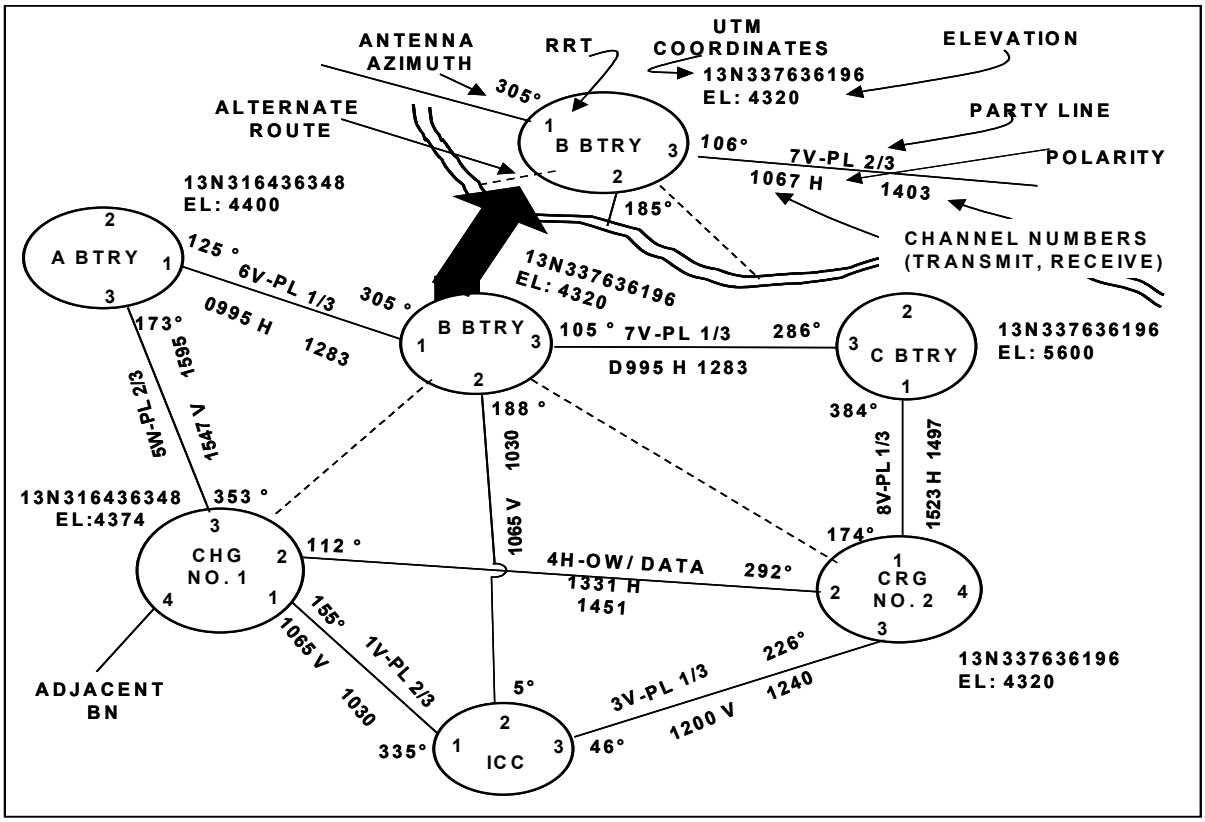



**Figure C-15. Notational Battalion UHF System Diagram**

## STANDARDIZATION

C-38. Standardization of communications tasks is essential for rapid system emplacement and operations. To the maximum extent possible, basic and communications functions should be standardized. Redundant links provide alternate paths for voice and data communications.

### COMMUNICATIONS PATCHING PANEL

C-39. Standardization at the ICC is achieved by the way voice party lines and data channels are patched. Party line 1 is patched to channel 1; party line 2 is patched to channel 2 of whichever UHF radio is being used; party line 3 is patched to channel 3, and party line 4 with data is patched to channel 4. The integrated digital operator control station (IDOCS) modernizes the system communications for interconnection, access, and monitoring of VHF, HF, TADIL-A, voice, and tactical party line conferencing. The IDOCS provides a means for patching voice and or data via electronic patching using the new communications OCU touch panel screen, this includes the ground communications filter unit (GCFU) wire line circuits, UHF/VHF radio circuits and the switch multiplexer unit (SMU) circuit switching system. Data channels within the battalion will be patched from RLRIU port 1 to channel 1 of RRT 1, from RLRIU port 2 to channel 2 of RRT 2, and so forth. This process will continue until all patching is complete.

## DATA CHANNELS

C-40. Channel 4 is dedicated for intrabattalion data transmissions. Channel 12 should not be used for data transmission since a synchronized pulse is routinely sampled from this channel. However, channel 12 can be used for voice transmissions. For more information concerning the use of communication, transmissions, and channels see FM 3-01.87. Through IDOCS, the user determines UHF radio traffic. A default setting on IDOCS allows direct access from the RLRIU, OCU voice battle circuits (2) and system management circuits. If the transmission rate over the UHF radio link is sufficient, the operator can allow the transmission of a FO-DTG containing 8 or 16 channels and a packet switch circuit. Figure C-16 provides the possible IDOCS/radio transmission rate and channel access available.

| EO-Group/CH. Rate (Kbps) | 576/32 | | 576/16 | | 512/16 | | 288/16 | |
|---|---|---|---|---|---|---|---|---|
| **Service** | **Ch's** | **Kpbs** | **Ch's** | **Kpbs** | **Ch's** | **Kpbs** | **Ch's** | **Kpbs** |
| **PADIL Data** | 1 | 32 | **2** | **32** | 2 | 32 | 2 | 32 |
| **2 Battle Circuits** | 4 | 128 | **8** | **128** | 8 | 128 | 8 | 128 |
| **System Management** | 1 | 32 | **2** | **32** | 2 | 32 | 1 | 16 |
| **Overhead** | 1 | 32 | **1** | **16** | 1 | 16 | 1 | 16 |
| **FO-DTG** | 8 | 256 | **16** | **256** | 16 | 256 | - | - |
| **Packet Switch (16,32,64)** | 1,2 | 32,64 | **1,2,4** | **16,32, 64** | 1,2 | 16,32 | - | - |
| **Total Ckts/Bandwidth** | 16,17 | 512,544 | **30,31,33** | **480,496, 528** | 30,31 | 480,496 | 12 | 192 |
| **Spare Channel Pool** | 2,1 | 64,32 | **6,5,3** | **96,80, 48** | 2,1 | 32,16 | 6 | 96 |

**Figure C-16. IDOCS Channel Access Availability**

## BATTALION AND INTERBATTALION COMMUNICATIONS

C-41. The five modems at the ICC and CRG are used for communications with brigade and adjacent units. Standardization is achieved by assigning; for example, modem 5 to channel 5 of whichever RRT is being used by the ICC or the CRG. Direct linking provides an alternative to the use of modems for interbattalion data communications. This process increases data throughput and provides data flow between lateral ICCs when modem hardware is unavailable. Up to six direct links can be established during initialization. For example, at initialization, the special direct link source codes to be accepted from battalion B over a direct link are set in the battalion A RLRIU. All data packets originating in battalion B will flow over any direct link antenna path established between the two battalions. Only

those data packets carrying the authorized data link source codes will be relayed into the battalion A net and passed into the battalion A computer by the ICC's RLRIU.

C-42. At battalion B, the same special direct link source codes are used in the RLRIU. Therefore, packets from battalion A carrying the authorized direct link source codes will also be relayed into the battalion B net and passed into the battalion B computer. A battalion net may also act as a relay between two other battalions using direct linking see Figure C-17 for illustration.

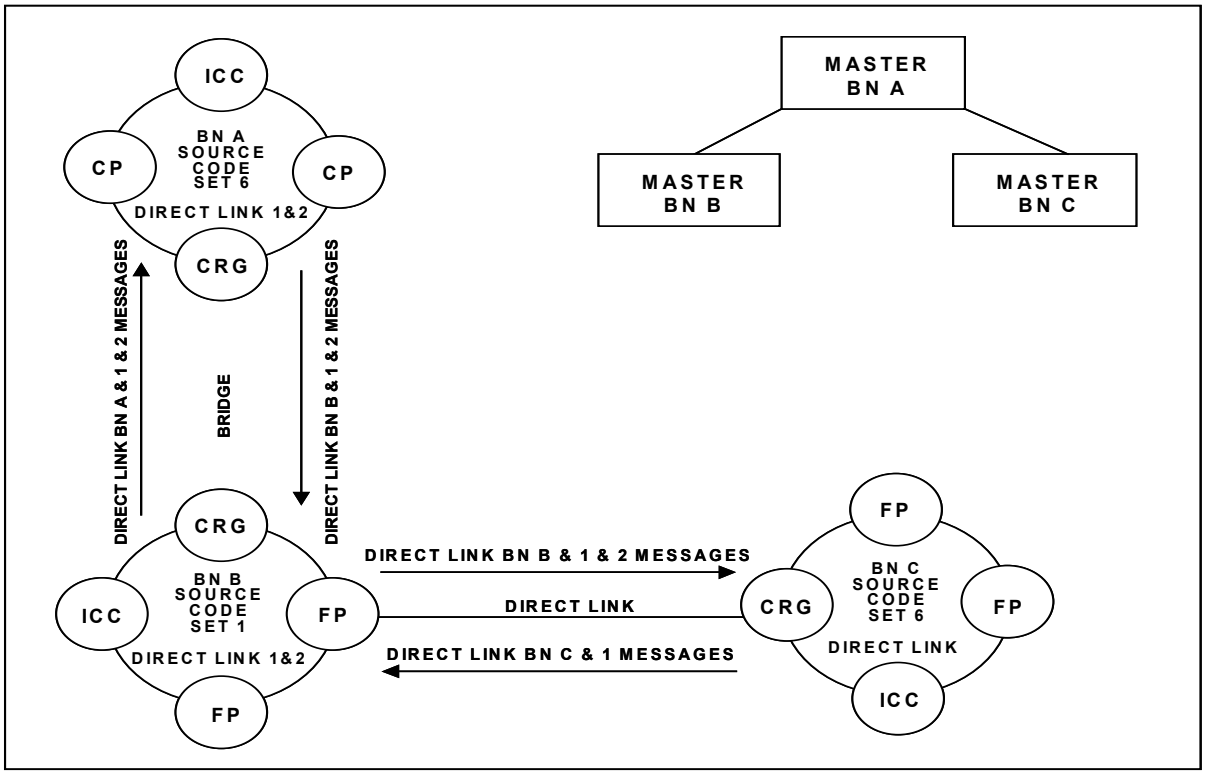



**Figure C-17. Direct Linking**

## PARTY LINE LOOPS

C-43. The party line loop switches located on the front of the battery CP must remain in the NORM position at all FUs and in the OPEN position at the ICCs. CRGs are also a part of communications standardizing.

## UHF RADIO

C-44. Use the same AN/GRC 103 radio at both ends of the link: for example, RRT 1 at the ICC to RRT 1 at FU 1. By setting up links in this manner, troubleshooting the links using the communications fault data tab at the ICC is made easier.

### PADIL NETWORK

C-45. In developing the data link network, the signal officer uses the ICC, CRG, and CRG/LCS deployment FU communications assignment to designate communications links, antenna azimuths, unit ID codes, and CRG locations. Up to six CRGs or LCSs may be deployed. A LCS is assigned the CRG symbol for display.

C-46. The FUs, the ICC, and the CRGs are shown in the communications diagram as a 360-degree perimeter. The distance from a unit to its perimeter represents 20−kilometers, which is half the nominal communications planning range. In determining whether units can communicate with each other, the individual observes the situation display and notes the proximity of the units to one another. If the symbols touch or overlap each other, they should be able to communicate without having to relay through a CRG. This assumes that the AMG is used and LOS exists. (If the unit symbols do not touch, the overall separation is 40−kilometers or more, and a CRG is required).

## SYSTEM INITIALIZATION

C-47. Once a communications plan is developed, the communications personnel in the ICC, ECS, and CRG/LCS must implement it. Operators at the ICC, CRG, and ECS use the previously discussed system diagram and the communications planning work sheet as guides in their emplacement procedures. This is only for the remote launch and communications enhancement upgrade (RLCEU) units only.

C-48. Initialization of the voice patch panel is through the integrated digital operator control station (IDOCS) that provides an automated electronic patching facility. Through IDOCS, the user determines UHF radio traffic. A default setting on IDOCS allows direct access from the RLRIU, OCU voice battle circuits (2) and system management circuits. If the transmission rate over the UHF radio link is sufficient, the operator can allow the transmission of a force operation digital transmission group containing 8 or 16 channels and a packet switch circuit.

C-49. Initialization of the switch miltiplexer unit (SMU) will allow access to the ACUS network. Each Patriot shelter, ICC, ECS, and CRGs, can interface with the ACUS (MSE or TRI-TAC) supporting communications systems in the same fashion as used at the ICC.

C-50. Once the system is initialized, the operational software monitors and checks the RRTs, RLRIUs, and modems at all units (ECS, ICC, and CRG). This information is displayed at the ICC in the communications link fault data tab. The tab, when used with the battalion UHF communications link diagram, is an excellent tool in determining link and equipment status. The information in the tab becomes available when data communications are established between links (RLRIU to RLRIU).

## DATA LINK CONSIDERATIONS

C-51. The Patriot data communications system is a multirouted net, which provides the ICC with multiple communications paths for data transmission. This multirouted net provides the Patriot system with low vulnerability to electronic countermeasures (ECMs), equipment outages, and a high data rate capability.

C-52.Patriot data communications is defined by or limited to the 32-kbps UHF multirouting network. Each linked unit, depending on its data protocol and initialized linkage, uses (loads) a portion of that total capacity. Based on the communications net plan, the unit percent loading will be under 100%. If the percent goes over a 100%, the tactical operator will be alerted on the K-7 display and actions must be taken to reduce the link load.

C-53. In the ICC, the PDB-5 software improvement, the network loading is automatically calculated and displayed for currently linked units. For planned deployments, this percentage, referred to as the deployed net loading percentage (DNLP) is also calculated and displayed in communications tabs.

C-54. Data communications can be accelerated between ICCs by initializing a "direct-link." A direct link (up to five are possible) bypasses modem hardware at ECSs and CRGs and allows full access to the 32-kbps net capacity.

C-55. Data modems located only at the ICC and CRGs, (five each per shelter), are required for data communications with ATDL-1, TADIL-J and TADIL-B units. An example of this is brigade TOC, THAAD, CRC, and auxiliary units. Figure C-18 illustrates the data link software capability.

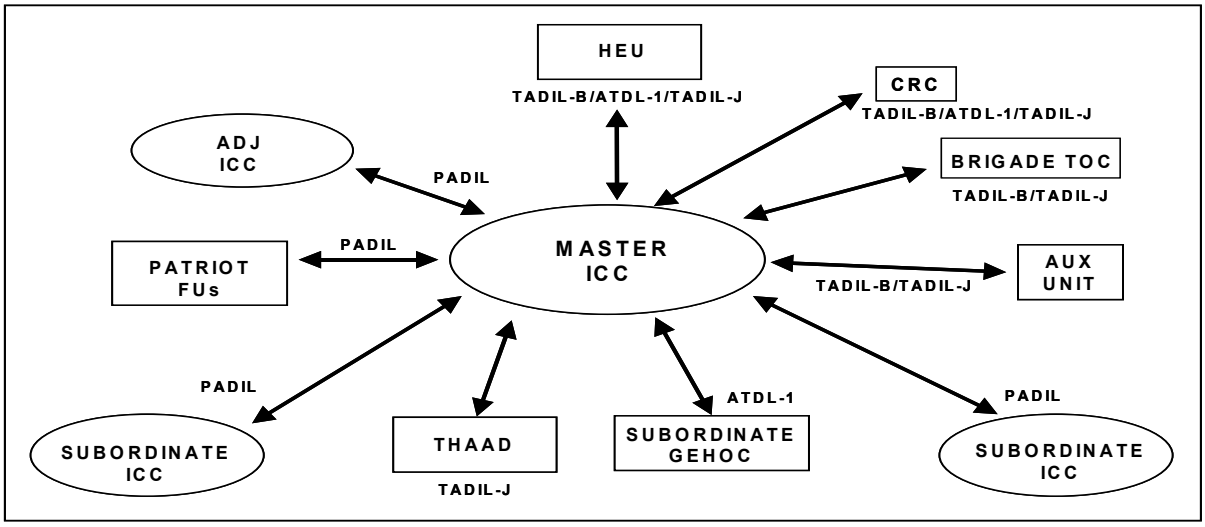



**Figure C-18. Data Link Software Capability**

## TACTICAL CONSIDERATIONS

C-56. Patriot multichannel UHF communications are subject to degradation under combat conditions. The system or operator may use the following procedures to help reduce the amount of communication degradation.

### SYSTEM LOADING REDUCTION MEASURES

C-57. Given DNLP > 100 percent, to maintain optimum system performance, the ICC will automatically degrade gradually its data communications to Patriot FUs first and then to or with CRG modem-ported Hawk fire units (if linked). The number of messages on the link(s) to FUs will be reduced and lower-priority messages for FUs will not be serviced as often. Note: Engagement and engagement-related commands are high-priority messages.

### OPERATOR LOADING REDUCTION MEASURES

C-58. Given an overloaded net where the DNLP is > 100 percent, the ICC operator will be alerted and must take the following actions:

- Disallow communications to one or more units, which reduces that unit's load by approximately one-half. Data still flows from the unit to the ICC.
- Reduce or eliminate "direct-links" to or with subordinate or adjacent ICCs that reduce that link's load by approximately one-third or greater.
- Transfer CRG modem-linked units to ICC modems that reduce that link's load to zero. Data still flows to and from the unit(s). The unit(s) must be relatively close to the ICC, if no CRG relay exists. LOS is required and data addressed to the ICC is not multirouted.
- Eliminate a data link to a unit(s) at the ICC, which reduces that link's load to zero. Data is disallowed to and from the unit. FU to FU communications have no loading reduction effect since FUs share the ICC's multirouting net.

## RECOMMENDATIONS

C-59. The following are some basic rules for UHF data communications. Additional information can be found in FM 44-01.87:

- Do not "overload." Although loading beyond 100 percent is possible, it certainly is not advisable. An overloaded net will result both by design and fact in degraded data communications.
- Plan link loading. With predicted "allowable" numbers and combinations of units, a link load-planning matrix should be consulted. Should one not be available, as a rough planning tool, use the following figures for prediction: each CRG modem-ported Hawk FU−5 percent; each Patriot FU−10 percent; each initialized external battalion unit linked through CRG modems−15 percent; and on "direct-link"−20 percent.
- Maximize use of ICC modems. From a network-loading standpoint, maximum use should be made of ICC modems, especially by collocated (1 to 5 kilometers) units, Hawk FUs when CRG availability is limited, and "relatively close" ATDL-1 or TADIL-D units. Again, units linked via these modems do not load the network or in any way affect the network's loading capacity.
- No use of "direct-link." Increases data throughout the ICCs, and minimal use should be made of "direct-linking" due to their

exorbitant impact on the network loading capacity. If loading capacity is sufficient (few links exist), direct links may be considered.

## Appendix D

# Intelligence Preparation of the Battlespace

This appendix covers intelligence preparation of the battlespace (IPB), the methodology used to analyze the threat and understand how the enemy commander will fight. It is tailored to the Patriot battalion and patterned after Chapter 2 of FM 2-01.3 (*Conducting Intelligence Preparation of the Battlefield)* and Appendix A of FM 3-01 (*Air Intelligence Preparation of the Battlefield).* Note: Battlespace is the term used to describe a three dimensional aspect that includes air, land, sea and space.

## ROLE OF THE COMMANDER & STAFF IN IPB

D-1. Air defense officers need to fully understand the plans, tactics, and drills prior to the exercise or operation beginning to ensure success–

- Commanders and staffs need to expect quality products from the air defense S2, so that the enemy picture is not distorted and the commander's battlefield visualization is accurate.
- Air defense officers must practice IPB and develop personal and staff IPB drills, in order to fight the enemy not the plan.
- Air defense officers should understand the relationship of the enemy air and missile threat against the friendly maneuver commander prior to developing an IPB.

D-2. The IPB process is time-consuming. IPB is not just a portion of the military decision making process (MDMP) or a significant aspect of the staff planning drill. It is a personal and professional skill that the air defense officer and S2 must take the time and energy to develop. Commanders at all levels have the responsibility of not only ensuring that IPB is understood by all air defense officers, but that all air defense officers under their command have an expert understanding of enemy air and missile tactics. This implies that commanders must be experts themselves.

## IPB PROCESS

D-3. The intelligence preparation of the battlespace has four steps–

- Define the battlespace's environment.
- Describe the battlespace's effects.
- Evaluate the threat.
- Determine threat courses of actions (COAs).

D-4. Each step in IPB can be considered as a point in planning where the analysis of the enemy is manifested in graphic products (identified with an asterisk in Figure D-1). The IPB is largely the focus of the intelligence section at the Patriot battalion. The S2 has a responsibility to ensure these products are developed at certain steps of the MDMP.

| MDMP STEP | PRODUCT IN (RECEIVED OR DEVELOPED DURING STEP | PRODUCT OUT (COMPLETED) |
|---|---|---|
| 1. **Receipt of Mission** | Msn/ Intent of Higher HQ | Issue WO #1 Initial Guidance |
| 2. **Mission Analysis** | Higher HQ's Order or Information<br>Modified Combined Obstacle Overlay (MCOO) *<br>Doctrinal Template *<br>Situational Templates and Narratives *<br>Staff Estimates | Situational Templates and Narratives *<br>Initial CCIRs*<br>Initial R & S Plan *<br>Restated Mission<br>Issue WO #2 |
| 3. **COA Development** | CDRs Intent/ Guidance<br>CDRs Approved Priorities (CVRT)<br>Correlation of Force--Air (COFA) *<br>Event Template and Matrix * | Course of Action Sketches<br>Course of Action Statements |
| 4. **COA Analysis** | COA Sketches<br>COA Statements<br>Decision Support Template and Matrix | Wargaming Results<br>CCIRs |
| 5. **COA Comparison** | Wargaming Results Established Criteria | Decision Matrix |
| 6. **COA Approval** | Decision Matrix | Patriot Task Order and MSN to Subordinate Units<br>Issue WO #3 |
| 7. **Order's Production** | Approved COA<br>Execution Matrix | Operations' Order<br>Rehearsal |

**Figure D-1. Air Defense MDMP Products**

D-5. The S2's analysis—manifested in these products—is critical to the commander's battlefield visualization and the development of the plan. In addition, each product is sequentially based upon the previous product; see Figure D-2 for the S2 product relationship. Analysis of the enemy is deduced and refined into an understanding of what the enemy commander can do, and what the enemy will do against certain friendly COAs.

D-6. Because the Patriot battalion's mission is air and missile defense, the S2 focuses on the enemy air, ASMs, CMs, UAVs, missiles, nuclear, biological and chemical (NBC), and special operations forces (SOF)/terrorist threat. The S2 must also keep abreast of the enemy maneuver or ground situation, as this aspect often affects the employment of an enemy's rocket or air force, as well as the introduction of NBC and its delivery means. Furthermore, Patriot FUs may be susceptible to enemy ground forces, such as corps Patriot FUs protecting a division rear, that is within range of enemy long-range artillery fires.

| INPUTS LEAD TO… | ENEMY GRAPHIC/DESCRIPTION |
|---|---|
| Analysis Of Battlefield Environment | Modified Combined Obstacle Overlay (MCOO) |
| Doctrinal Templates, MCOO, TPLs | Situational Templates And Narratives |
| Situational TEMP/Narratives, NAIs | Event Templates And Matrices |
| Event TEMP/Matrices, COFA, TAIs, DPs | Decision Support Template And Matrix |

**Figure D-2. S2 Product Relationship**

## DEFINE THE BATTLESPACE ENVIRONMENT

D-7. Defining the battlespace environment consists of six steps that lead to an understanding of where and under what conditions the enemy air, missile and SOF/terrorist forces (as well as the Patriot FUs), will fight. These steps are as follows:

- Identify significant characteristics of the environment.
- Identify the limits of the command's area of operations (AO) and battlespace.
- Establish the limits of the area of interest (AI).
- Identify the amount of detail required and feasible within the time available for IPB.
- Evaluate existing databases and identify intelligence gaps.
- Collect the material and intelligence required to conduct the remainder of IPB.

### Identify Significant Characteristics of the Environment

D-8. Consideration must be given to the geographical, cultural, political, and economic factors of the area to identify characteristics that may influence the enemy or friendly commander's decision-making or COAs. In doing so, the S2 begins to focus, or look for, these special considerations throughout the process. Examples of significant characteristics include, but are not limited to—

- Political relationship between host nation, multinational forces, and US (may affect deployment timelines, peacetime and wartime rules of engagement (ROE), etcetera.).
- Economics of the area provides clues to the development of road networks and the movement abilities of TM and Patriot forces.

- Sanitation and medical aspects related to soldier health.
- Communication services such as phone, computer, and satellite capabilities.
- Host nation's capability to support Patriot operations.

**Identify the Limits of the Command's Area of Operations (AO) and Battlespace**

D-9. The AO is the geographical area where the commander has the authority and the responsibility to conduct operations. Because Patriot forces don't "own" ground as much as they are assigned to protect it (or the asset on it), the Patriot AO has a third dimension. The air area of operations not only extends to what assets (whether maneuver or static) it may defend, but also to the maximum altitude of the Patriot system. Thus, the AO for Patriot battalions has depth, width, and height. As the plan is developed, external factors such as airspace control measures (missile engagement zones [MEZs], fire support coordination lines [FSCLs], and restricted operations zones [ROZs]) can impact upon the commander's AO.

D-10. The battlespace is defined by the Patriot battalion's maximum capability to acquire targets and *physically dominate* the enemy. Battlespace can extend beyond the battalion's AO and can expand or contract based upon the capabilities and activities of the enemy and friendly forces. Battlespace should not be considered the same as the AO; in fact, the battlespace normally extends beyond it.

**Establish the Limits of the Area of Interest**

D-11. The area of interest (AI) is the geographical area from which information and intelligence are required to permit planning or successful conduct of the battalion's mission. Because the battalion is concerned with enemy activities, the air area of interest extends vertically to include aircraft ceilings and TBM trajectories. This also includes activities on the ground (such as airbases, TBM forward operating bases (FOBs), and transload points) that may affect or result in affecting friendly forces or the protected assets. This information should also contain analysis of the enemy maneuver forces, and any threat they pose to the Patriot battalion.

D-12. When considering UAVs, ASMs, CMs and TBM ranges and launch points, the AI will normally be tremendously large. A technique that can reduce the size of the AI, as well as reduce the area under scrutiny, is to—

- Know the type of missile and its maximum range under optimal conditions (without consideration to battlefield effects).
- Assume the worst case and draw range arcs from the outermost point of the enemy's border or line of departure/line of contact (LD/LC). The result should show a series of range arcs for different missiles and the friendly territory that it is most vulnerable.
- Identify potential targets within the threat arc, as well as the defended assets (see DAL).
- Draw or reverse the missile arcs back into threat territory for each asset and each type of missile from each potential target or assigned/defended asset.

- Erase overlapping lines.
- Ending results are range arcs that indicate where TBM forces generally could deploy and launch missiles under optimal conditions, without consideration to battlespace effects. This is the initial representation of the TBM AI.

### Identify the Amount of Detail Required and Feasible Within the Time Available for IPB

D-13. Once the AO, AI, and battlespace has been identified and graphically portrayed, the S2 must consider how much detail is required and necessary based upon the battalion's planning timeline (refer to Chapter 3). Because the commander relies significantly on the S2 to portray the enemy, the S2 must ensure that he has the necessary time built into the timeline in order to successfully analyze the enemy.

### Evaluate Existing Databases and Identify Intelligence Gaps

D-14. The battalion S2 quickly reviews previous and current databases and threat models that were used to develop OPLANs, previous operations, and etcetera, in order to determine gaps in the ongoing analysis and set priorities for answering those gaps (such as TBM, CM and ASM launch points). Acting on these gaps, the S2 should determine what gaps are intelligence requirements that must be prioritized. If the gaps cannot be answered before mission analysis, the S2 should make reasonable assumptions and brief these to the commander and staff.

### Collect the Material and Intelligence Required to Conduct the Remainder of IPB

D-15. The battalion S2 initiates request for information and collects intelligence from the sources available to him. As information becomes available, the S2 must review all assumptions made to eliminate those now known as fact, and to test the remaining assumptions for validity. Any gaps not identified previously must be determined if they need to be added to the priority intelligence requirements (PIRs) of the commander's critical information requirements (CCIRs). PIRs should be judiciously chosen in order to avoid information overload, frustration, and complacency.

## DESCRIBE THE BATTLESPACE'S EFFECTS

D-16. Describing the battlespace's points to the effect the environment will have—in terms of advantages and disadvantages—on enemy and friendly capabilities. It is divided into two steps—

- Analyze the battlespace's environment.
- Describe the battlespace's effects on enemy and friendly capabilities, as well as broad COAs.

D-17. The analysis of the battlespace will vary depending upon what portion, or aspect of the battlespace is being analyzed. For example, the area around which Patriot forces may deploy must be analyzed in detail with respect to the terrain, especially when considering trafficability and route acceptability

needed for FU's. Weather has different variations as well as different meanings of significance for different portions of the battlefield. For example:

on a given day there may be fog at certain enemy airbases (which may reduce sorties rates), it could be heavily raining in the vicinity of a templated enemy missile brigade (which may restrict TEL movement), and it could be clear and sunny in the friendly AOR (which may provide excellent flying conditions for friendly DCA operations while providing excellent observation of Patriot FUs by enemy SOF or terrorists).

**Analyze the Battlespace's Environment**

D-18. There are two components of this step: terrain and weather. The Patriot battalion S2 must analyze terrain and weather to point out the effects to the enemy threat as well as to the Patriot battalion. The battalion S2 must make use of graphical representations and programs. Map drops, along with computerized programs such as arc digitized raster graphics (ADRG), digital terrain elevation data (DTED), and terrain base, should be used to visualize the battlespace. Terrain and weather analysis includes an examination of the ground in relation to both ground and air units. IPB in relation to air defense operations does not just focus on the impact to enemy air operations; rather, it includes an impact on TBM, SOF, NBC and Patriot forces as well. The S2 must recognize that he does not have enough time to analyze the SOF/terrorist threat for each battery site; rather, he should analyze the area in which the battalion will operate and provide the necessary information that the battery commander requires for the development of his counter-reconnaissance plan.

**Terrain**

D-19. Observation, Cover and Concealment, Obstacles, Key Terrain, and Avenues of Approach, (OCOKA), is used to evaluate the military aspects of terrain.

D-20. Observation—directly relates to target acquisition, SOF observation, and the best areas for TBM launch. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– potential engagement areas.
- TBM– TEL launch areas.
- SOF– potential ambush points (kill zones) along routes, main supply routes (MSRs), and sites.
- Patriot– potential areas that afford radar field of view (FOV) or minimized radar clutter.

D-21. Cover and concealment—cover is protection from observation. Concealment is protection from the effects of direct and indirect fires. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– terrain that permits reverse slope loitering/denies Patriot target acquisition.
- TBM– TEL hide sites.
- SOF– cache point, patrol base, or insurgent base camp/safe house.

- Patriot– site terrain that provides protection from direct fires.

D-22. Obstacles—any natural or manmade terrain feature that stops, impedes, or diverts military movement. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– terrain that denies nap of the earth/contour flight, or restricts lateral movement.
- TBM– surface drainage and slope configuration that impedes TEL cross-country movement.
- SOF– unnatural vegetation or terrain (such as forested areas in a desert or unusual architecture in urban terrain), which is conspicuous to the common observer.
- Patriot– (observation) mountains or terrain that prevent or reduce line-of-sight (LOS) and observation of UHF/VHF communications.

D-23. Key terrain—any locality or area that when seized, retained, or controlled, affords a marked advantage to either combatant. Key terrain is consistent with areas that give good observation over AAs and objectives, permit an obstacle to be covered by fire (or an attack orbit for FW, and loitering for RW), or are important road junctions/communication centers. Assets can also be considered key terrain when they are known to be likely threat objectives. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– potential airfields', landing zones, drops zones, or terrain that can be used as navigational aids.
- TBM– transload points or FOBs.
- SOF– terrain that controls one or more route chokepoints.
- Patriot– terrain that provides coverage for more than one asset, or allows the sluing to one or more secondary target lines (STLs).

D-24. Avenues of approach– air or ground route of an attacking force leading to its objective or to key terrain in its path. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– air avenues of approach.
- TBM– TEL withdrawal routes from launch points to post-launch hide sites.
- SOF– approach routes to ambush/attack points.

**Weather**

D-25. Weather– when analyzing the weather, the following aspects are considered:

- Wind.
- Precipitation.
- Cloud cover.
- Temperature and humidity.
- Visibility.
- Barometric pressure.

D-26. Winds– the effects of wind include blowing sand, smoke, dust, rain, or the force of the wind itself. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– fuel and payload impacts on aircraft attempting to ingress or egress near their standard combat radius.
- TBM– trajectory precision and circular error probability (CEP) based upon winds located at the launch point.
- SOF– effect on insertion operations from the air.
- Patriot– effect on communications, particularly UHF and VHF antennas and resultant degree of control on the air battle.

D-27. Precipitation– precipitation not only affects the soil conditions, but in heavy amounts, it can significantly affect personnel and equipment. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– degree of icing on airframe prior or during flight.
- TBM– degradation effect on chemical and biological munitions.
- SOF– effect on supplies and health.
- Patriot– effect on potential missile storage areas in low ground or enclosed by berms.

D-28. Cloud cover– influences aircraft and SOF operations, while having a negligible or favorable effect on TBM and Patriot operations. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– low cloud ceiling may force aircraft to use unfavorable attack profile in relation to munition used.
- TBM– heavy cloud cover denies visual surveillance of TBM field activities (transload operations, movement, etcetera).
- SOF– allows movement of units in higher elevations due to degradation of visual and heat surveillance systems.
- Patriot– heavy cloud cover masks movement of FUs from enemy air visual surveillance.

D-29. Temperature and humidity– the extremes have negative effects on personnel and equipment capabilities, particularly in hot and wet climates. As temperature and humidity increase, the air density decreases, thus reducing airframe payloads. Examples include, but are not limited to:

- Aircraft, CMs, and UAVs– reduction in airframe payload, ordnance, and combat radius.
- TBM– unexpected high/low temperatures can decrease crew performance and increase maintenance requirements.
- SOF– effect on aerial resupply as well as personnel endurance.
- Patriot– unexpected high/low temperatures can decrease crew performance and increase maintenance requirements.

D-30. Visibility– incorporates the effects of all aspects of weather and is not just concerned with illumination. The S2 must know beginning morning nautical twilight/end evening nautical twilight (BMNT/EENT), sunrise/sunset, and moonrise/moonset. Examples include, but are not limited to—

- Aircraft, CMs, and UAVs– fog around airbases may lower sortie generation.

- TBM– lack of cloud cover allows better aerial and ground surveillance of TBM force movement.
- SOF– storm weather that reduces visibility may conceal movement from friendly forces and populations.
- Patriot– higher moon illumination allows Patriot security elements to surveil against SOF/terrorist night attacks.

D-31. Barometric Pressure– if the battalion does not have access to meteorological analysis, the intelligence section must pay close attention to barometric pressure readings over the past 16 hours, in 2-hour increments. In spite of current visual conditions (example "it's raining or its not raining), the intelligence section should maintain a barometer to indicate what future conditions will be like. If the air pressure falls, then the weather is deteriorating. If the air pressure is constant, then current conditions will remain the same. If the air pressure rises, then better weather is to be expected. The section should remember that air pressure is related to elevation. Movement or relocation to a different elevation will result in a different baseline reading.

**Terrain and Weather Analysis**

D-32. The results of weather and terrain analysis can be graphically represented in the modified combined obstacle overlay (MCOO). Symbology not available should be depicted in a manner consistent with easy identification and understanding. If time permits, the MCOO should be created for TBM baskets, or areas where TBM battalions and brigades are determined to be operating from.

D-33. MCOO step 1–display cumulative effects of obstacles and terrain

- Unrestricted terrain– allows wide maneuver by forces and unlimited travel supported by well-developed road networks. Vegetation is minimal.
- Restricted terrain– hinders movement to some degree, requiring zigzagging, detours, reduced speeds, or changing movement formations. Road networks are generally secondary or poorly developed. Vegetation can be moderate or densely packed in small areas. Slopes are generally moderate. Soil conditions in some areas slow movement of heavy equipment. Green, diagonal lines mark-restricted terrain.
- Severely restricted terrain– stops or slows movement to such a degree that engineer effort must be made in order to enhance mobility. Road networks are absent or seasonally poor. Vegetation can be thick, such as triple canopy forests. Slopes are generally steep. Soil conditions are susceptible to precipitation, making cross-country movement impossible. Green, crossed, diagonal lines mark severely restricted terrain. Other types of severely restricted terrain include minefields, urban areas, and seasonal lakebeds. In addition, simply identifying severely restricted terrain does not necessarily mean that a Patriot or TBM unit moving in column formation along a small road or firebreak can't traverse it. What it indicates is the general, relative effect on that particular force.

D-34. MCOO step 2–display ground and air avenues of approach as follows:

- Identify mobility corridors. Use red for enemy air forces, and blue for friendly, if applicable.
- Categorize mobility corridors. When considering air, include the differences between rotary wing and fixed wing (some RW and FW mobility corridors may become an air avenue of approach (AAA) that is used for both).
- Group mobility corridors to form AAAs.
- Evaluate AAAs. For AAAs, evaluate whether used by attack FW/RW, transport FW/RW, etcetera.
- Prioritize AAAs. Evaluate each AAA in relation to the threat objectives or defended assets. Each AAA should be assigned a number convention.
- Other considerations. For SOF forces, identify infiltration lanes and withdrawal lanes, as well as landing zone and drop zone (LZ and DZ) locations. If time permits, AAAs should indicate potential engagement areas and ordnance release lines (ORLs).

D-35. MCOO step 3—display key terrain as follows:

- Natural and manmade key terrain is marked with a circled K (black or purple).
- Ensure to display key terrain that is important along air and ground AAs.
- Evaluate the other four aspects of military terrain, and graphically represent the analysis.

## BATTLESPACE'S EFFECTS ON ENEMY AND FRIENDLY CAPABILITIES

D-36. Using MCOO, the battalion S2 must now prepare to discuss the military aspects of terrain and weather and relate this analysis to aircraft, ASM, CM, UAV, TBM, SOF, and Patriot forces. The S2 will brief the commander during mission analysis, and discuss why certain aspects are important and the effect on broad enemy and friendly COAs.

### EVALUATE THE THREAT

D-37. Evaluation of the threat centers on the enemy's capabilities and the employment of doctrinal principles under optimal conditions are manifested in the doctrinal template. The doctrinal template is a threat model that demonstrates doctrinally and historically how aircraft, TMs, and SOF forces are employed. It can be in any format, but it must answer in a graphical and narrative nature how forces are doctrinally employed.

D-38. Prior to any operation, the battalion intelligence section should be consistently creating and updating threat databases and models. Time during an actual operation simply does not permit the S2 to start from scratch. Instead, the battalion S2 should only have to update existing threat models in terms of new capabilities or variations in the enemy order of battle. If the S2 has not previously developed threat models, the battalion will be hindered in its planning process.

D-39. Threat models should answer how the enemy air and missile threat will employ during offensive and defensive operations. To speed the process, these threat models may even follow the format of a generic situational template and narrative for basic COAs (see Step 4, Determine Threat COAs). Threat models should answer the following criteria:

- Enemy air, TBM, and SOF's order of battle.
- Aircraft type, number, and units/formations/organization (to include munitions).
- SOF units/formations/organization.
- Aircraft operating bases with aircraft distribution.
- TBM dispersal hide sites and or FOBs.
- Enemy employment of UAVs, ASMs and cruise missiles.
- Enemy equipment characteristics (to include munition characteristics such as ranges, ORLs, and CEPs).
- Enemy air, TBM, and SOF strategic, operational, and tactical objectives.
- Enemy air, TBM, and SOF strategic, operational, and tactical doctrinal procedures (to include use of NBC and release authority).
- TBM types, numbers, and units/formations/organization.

**Enemy Employment and Warfighting History**

D-40. This criteria also assists the staff in preparing the commander's CCIRs, especially the PIRs ("What I want to know about the enemy") and EEFIs, ("What I don't want the enemy to know about myself").

D-41. Once the enemy's capabilities are known, battalion S2 must analyze the threat in order to understand how these capabilities are used. The S2 must answer—

- Enemy capability to synchronize air and missile attacks.
- Enemy proficiency (example pilot training, TBM individual soldier training, SOF training and motivation).
- Enemy maintenance capability (to include availability of spare parts)
- Potential of nondoctrinal and unconventional use of forces.

D-42. The S2 then develops the high value target (HVT) list. An HVT is an asset that the threat commander requires for the successful completion of a specific COA. The S2 identifies the HVTs based upon an evaluation of the database, the doctrinal template, and tactical judgment. Thus, the S2 has generally war-gamed enemy actions, and has identified what the enemy HVTs are in terms of the enemy air and missile threat. Because of the ability of Patriot and the nature of air defense operations, when identifying and prioritizing HVTs, the S2 should consider—

- The TBM battalion organization and the importance of specialized equipment such as reload cranes, meteorological radars, and repair equipment.
- ECM capabilities of aircraft, to include jamming aircraft.
- Anti-radiation missiles (ARMs) and their carriers.

- Command, control, communications (C3) systems that would improve the capability to conduct simultaneous air and missile attack.

D-43. The Patriot battalion does not have organic assets to attack these HVTs; however, the commander and staff must be aware of the enemy commander's capability. In addition, the HVTs identified by the battalion S2 must be forwarded to higher echelon intelligence and operational sections. Higher headquarters such as AAMDC and corps assets have the roles related to attack operations. HVTs are later refined after the development of situational templates/narratives.

## DETERMINE THREAT COURSES OF ACTION

D-44. The development of enemy COAs requires specific products to be made. Because it incorporates the effects of the battlefield, the result of this step provides the Patriot commander with visualization of how the enemy commander will fight his air and missile forces. There are five steps to determining threat COAs—

- Identify the threat's likely objectives and desired end state.
- Identify the full set of COAs available to the threat.
- Evaluate and prioritize each COA.
- Develop each COA for detail time allows.
- Identify initial collection requirements.

### Identify the Threat's Likely Objectives and Desired End State

D-45. The battalion S2 must start at the strategic level of enemy command, then work his way down, in terms of threat air, missile, and surveillance forces. The S2 must identify the strategic, operational, and tactical objectives—from the highest level of enemy command down to the aircraft sorties by AAA, the TBM firing battalions, and the small SOF teams operating in the friendly rear areas. The S2 then reviews the tactical and operational objectives to ensure they fulfill the parent command's desired end state.

### Identify the Full Set of COAs Available to the Threat

D-46. The S2 must consider a complete set of COAs available to the enemy. At a minimum, the S2 must consider—

- COAs in which enemy doctrine applies to the current situation.
- COAs that could significantly influence the battalion's mission (this includes "wildcard" COAs).
- COAs that are possibly based upon recent events.

D-47. The S2 must eliminate any COA that the threat is incapable of performing. In addition, the enemy COAs must be weighed against the five criteria, or qualities of COAs: suitability, feasibility, acceptability, distinguishability, and completeness (see Chapter 3 for definitions).

### Evaluate and Prioritize Each COA

D-48. The S2 must carefully evaluate each COA and determine which is most likely to be used against the enemy. This is necessary, as the staff will need a basis from which to develop friendly COAs. Once the S2 has determined the COAs in priority, he can categorize them as most likely (MLCOA), most dangerous (MDCOA), and less likely (LLCOA).

### Develop Each COA in the Amount of Detail Time Allows

D-49. The enemy COAs must now be developed into situation templates (SIT TEMPs). SIT TEMPs are graphical representations of an enemy COA, and contain three parts: a template (or graphic), a narrative explaining the graphic, see Figure D-3 for illustration, and a listing of HVTs for that enemy COA. Like the friendly COA, they are normally snapshots in time that explain the decisive point in the air battle (refer to COA development, Chapter 3, for explanation on decisive points). SIT TEMPs are eventually used for war-gaming and later developed into event templates.

| TIME | H + | H + | H + | H + | H + | H + | H + | H + |
|---|---|---|---|---|---|---|---|---|
| FRIENDLY ACTION | | | | | | | | |
| ENEMY DP | | | | | | | | |
| ENEMY MVR | | | | | | | | |
| ENEMY TBM | | | | | | | | |
| ENEMY FW | | | | | | | | |
| ENEMY RW | | | | | | | | |

**Figure D-3. SIT TEMP Narrative**

D-50. In order to properly synchronize the enemies COAs with the Patriot battalion's critical battle times, the S2 should discuss with the S3 the definition of H-hour. This will assist all staff members in developing and comparing friendly COAs with the enemy templates. Whenever possible, SIT TEMP graphics should be depicted on overlays and maps—

- Begin with the threat model that represents the current operation.
- Overlay the doctrinal template over the MCOO, or refer to a sketched doctrinal template and narrative.
- Place another overlay over the MCOO. Adjust the threat model/doctrinal template in consideration of the battlespace's effects and tactical judgment.

- Write a narrative using a matrix format or paragraph format. A technique is to write critical events over time using H-hour as a guide (events can occur prior to H-hour [H-___] and after H-hour [H+___].
- Check to see if all enemy forces pertinent are accounted for (aircraft, TMs, SOFs, and ground forces that precipitate air/missile events).
- Ensure that the SIT TEMP answers the air and TM attacks/threats of concern. This will also assist in the development of COFA (see Chapter 3).

D-51. S2s should keep in mind that enemy air forces might fly many sorties a day. However, the danger to Patriot operations is the most dangerous air threat per AAA each day. This should be annotated for every COA, to include MLCOA, MDCOA, and LLCOA. An example would be: "*under the MLCOA, expect sorties of 2-4 Mig-25 mounted w/AS-11s will conduct deep strikes along AAA#2/day"*

- Review possible engagement areas by aircraft along AAAs (these will later develop into targeted areas of interest [TAIs]). These include points in space that begin aircraft attack profiles, to include ORLs.
- If information about ORLs is not available, a technique to determine an enemy engagement point is to compare the maximum launch range of ordnance in relation to the battlespace effects (MCOO).
- Graphically identify time phase lines (TPLs). TPLs are used to understand the movement of forces. In the case of aircraft, TPLs should depict the speed of attacking enemy sorties along each AAA. Working backwards from the engagement area, the S2 will sequentially draw lines (in terms of minutes) that depict the aircraft ingress and attack speeds in relation to the battlespace effects and AAA.

D-52. Unlike maneuver forces that draw TPLs in relation to the enemy maneuver force movement, the complex, frequent, and varied nature of attacking enemy aircraft requires the Patriot battalion S2 to explain TPLs in relation to the aircraft attack itself. However, the S2 must analyze and discuss when air and missile attacks will occur in the narrative.

- Consider areas in time and space that determine certain enemy COAs. Examples include enemy aircraft that have chosen a specific AAA to fly (for example, a mountain pass that canalizes the aircraft's approach), or an enemy missile battalion conducting field operations (for example, a bridge that battalion K-51 cranes must cross in order to establish transload sites). These areas will develop into named areas of interest (NAIs). NAIs are points in space and time that confirm or deny a certain enemy COA.
- Review/develop a list of HVTs for each COA.

D-53. In addition to the five qualities, the battalion S2 must review the SIT TEMPs to ensure each COA answers—

- WHAT—the type of operation (related to the enemy maneuver force such as defense, offense, etcetera.).
- WHEN—the time expressed in the narrative.
- WHERE—the AAAs, TM NAIs, launch points, SOF ambush sites, and objectives that make up the COA.
- HOW—enemy methods, such as TBM operational phases (dispersal sites, FOBs, transload operations, pre-launch hide sites, launch points, post-hide/reload sites, etcetera), and aircraft missions (deep strike, close air support, reconnaissance, ECM, bombing, combat air patrol, etcetera.).
- WHY—the objective or end state the enemy wants to accomplish (usually related to the strategic or operational mission of the enemy maneuver force).

D-54. The battalion intelligence will be pressed for time; however, the section must recognize that the well-prepared enemy COAs contribute significantly to the commander's understanding of the battlefield, and provide the litmus test in which friendly COAs are measured against.

**Identify Initial Collection Requirements**

D-55. The battalion S2 must then identify collection requirements that will assist in identifying which COA the enemy will actually commit to. The battalion S2 must first identify NAIs.

D-56. Although the battalion S2 may send request for information (RFIs), (see Figure D-4 for worksheet), the observation and analysis of enemy activities over time at specific areas (NAIs) will reveal the enemy's chosen COA.

D-57. In order to identify and categorize NAIs, the battalion S2 develops an Event Template/Matrix see Figures D-4 for matrix illustration. The EVENT TEMP is the Patriot battalion's guide for intelligence collection. Each COA is evaluated to identify its associated NAIs. NAIs are then numbered in the matrix (that explains each NAI) and symbolized on a separate sheet of overlay. NAIs can be a specific point, route, or an area, whether on the ground or in the air. The battalion S2 must also refer to the higher headquarters order to check for NAIs listed by the brigade, AAMDC, or corps, and pay attention to ground NAIs that influence the air and missile battle. In addition, he should review HVTs and their relation or development towards NAIs when they are committed in each COA.

D-58. To avoid confusion, the battalion S2 may designate air NAIs as "ANAIs #___", and remaining ground NAIs as simply "NAI #__". However, any higher NAIs must retain their naming convention as assigned by higher headquarters.

| REQUEST: | | ANSWER: |
|---|---|---|
| TO RESPONSIBLE STAFF | SECTION: | |
| DATE-TIME-GROUPS: | INITIALS | NEGATIVE REPLY RESPONSE (IF ANSWER NOT GIVEN): |
| REQUEST DATE-TIME-GROUP: | | |
| REQUEST RECEIVED BY RESPONSIBLE STAFF DATE - TIME-GROUP: | | |
| REQUEST RETURNED TO DATE TIME-GROUP: | | |

| NAI | EVENT | TIME | | INDICATES COA |
|---|---|---|---|---|
| | | EARLIEST | LATEST | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
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**Figure D-4. RFI Worksheet and Event Template Matrix**

D-59. Decision support template. As stated before, the enemy COAs are critical to the staff war-gaming process. As the friendly and enemy COAs are wargamed by the S3 and S2 respectively, the list of NAIs will be further refined and developed. An analysis of the EVENT TEMPs with the results of the DST as shown in Figure D-5, will assist the development of HVTs into high payoff targets (HPTs), which are targets whose loss to the enemy will contribute to the success of the friendly COA. In addition, decision points (a point or area in time and space that requires the friendly commander to make a decision) and TAIs (where one or more friendly air defense weapons are brought to bear on the enemy) are developed as a result of NAIs and a review of the enemy's engagement areas and ORLs.

| DP | TIMELINE/EN OPTIONS/EN REACTION | C/ACTION OR TRIGGER POINT | OBSERVER |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Figure D-5. DST Example**

D-60. Clearly, the key to the IPB process is the development of threat models, or doctrinal templates, prior to operation notification. The battalion S2 should constantly be developing these templates in relation to threat countries and capabilities. These threat models should be distributed and briefed to officers in the battalion on a regular bases, as they form the battlespace visualization that leads to OPLAN development, and as shown in this appendix, the subsequent defense design in real-world air and missile defense operations.

## Appendix E

# Safety

This appendix describes the responsibilities of the commander and safety officer, and discusses procedures for identifying and assessing safety problems that may arise during training or operations. It also describes general safety precautions that must be observed during Patriot operations as well as special hazards associated with Patriot system.

## RESPONSIBILITIES

E-1. The commander has overall responsibility for unit safety and normally appoints a safety officer to coordinate safety activities. The commander must ensure that the safety annex of the unit tactical SOP is current and covers all field-training operations. He must also ensure that adequate provisions for safe practices, procedures, and physical standards are incorporated into unit functions, activities, exercises, and combat operations.

E-2. The safety officer must keep the commander informed of the unit safety status by reporting all accidents, injuries, and incidents, and recommending corrective actions. The safety officer must also—

- Develop, supervise, and monitor command safety, risk management, and accident prevention programs.
- Coordinate with other staff officers to ensure appropriate safety measures are implemented and safety issues are addressed. Specific coordinating responsibilities are listed in FM 101-5.
- Prepare risk assessments and recommend appropriate risk reduction control measures. Specific risk management and assessment responsibilities are described in FM 101-5.
- Document and file accident reports, safety training, and risk assessments in accordance with the *Modern Army Records Keeping System* (AR 25-400-2).

## IDENTIFYING AND ASSESSING SAFETY ISSUES

E-3. Safety issues that arise during Patriot operations can be categorized as follows:

- Known issues that have been previously identified and assessed during Patriot system development, test and evaluation, and field exercises. These include such hazards as misfires, RF radiation, launcher backblast, equipment noise, toxic materials, high voltages, and vehicle movement hazards.
- Unknown issues that may arise when the Patriot system is operated in a dynamic battlefield environment. On the battlefield, the weather, terrain, enemy situation, and other factors are continuously changing, placing additional demands on personnel and equipment, and increasing the likelihood accidents may occur.

E-4. To ensure that safety issues are proactively identified and assessed, a risk management process, described in FM 3-100.14 (*Risk Management*), should be implemented. FM 3-100.14 explains the principles and procedures that must be followed to successfully identify, evaluate, and resolve (or mitigate) safety problems that are likely to arise during training or operations.

## PATRIOT SYSTEM SAFETY

E-5. Patriot system operator and maintenance personnel must be aware of the hazards associated with the equipment. All personnel must observe safety practices and procedures outlined in DA publications. The Patriot operations and crew drill manuals should be consulted for complete information on equipment hazards.

### GENERAL PRECAUTIONS

E-6. The following general safety precautions must be followed to prevent personnel injury or equipment damage—

- Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is trained in administering first aid.
- Be careful when handling high voltage power cables. This hazard can result in death or serious injury to personnel.
- Wear adequate hearing protection when working in the vicinity of operating equipment. Irreversible hearing loss may result from long-term exposure to high noise levels.
- Wear gloves or other protective clothing when working in extremely cold or icy conditions. Frostbite or other incapacitating injuries may result.
- Work in well-ventilated areas when operating the power units and vehicles. Carbon monoxide emissions may be sufficient to cause death when inhaled.
- Do not walk on tools or components removed from the system. Damage to equipment or personnel injury may result.
- Do not smoke or have any open flame near or around any fuel containers or solvents.

### SPECIAL HAZARDS

E-7. Special hazards associated with Patriot operations include misfires, RF radiation, launcher backblast, toxic materials, and equipment electrical, mechanical, and thermal hazards. These hazards, possible adverse effects and remedial (or preventative) actions are summarized in Table E-1. Figure E-1 shows the possible placement of Patriot equipment with the hazard areas for the radar (located in the center) marked in relation to other equipment. Additionally the figure shows possible STLs for the radar.

**Table E-1. Special Hazards**

| HAZARD | ADVERSE EFFECTS | ACTIONS (REMEDIAL OR PREVENTATIVE) |
|---|---|---|
| **Missile Hazards:**<br><br>(1) Damaged live round<br><br>(2) Misfire; missile fails to leave canister or missile exits canister, falls to earth, does not detonate | **DEATH OR SERIOUS INJURY** | Leave area, minimum safe distance is 1250 feet (381 meters). Call EOD; If (1) canister, LS or GMT is on fire; (2) Missile has partially exited canister during launch attempt; (3) Canister 4-pack has been dropped, damaged, or exposing a missile. |

| | | |
|---|---|---|
| **RF Radiation**<br>(1) Radar set<br><br>(2) AMG | RF Radiation heats body tissues, and if sufficiently high will permanently damage tissue. Damage is NOT immediately apparent. | Radar Set: Stay out of denied occupancy zone, the area is within 120 meters in front of the RS, and at least 2 meters from sides and rear of RS. (See Fig E-1). Observe safety precautions listed in RS operator manual (TM 9-1430-601-10-1).<br>Before Placing RS in remote, conduct visual inspection of RS to ensure all crewmembers have vacated the area.<br>Post RF radiation-warning signs at right/left limits of radar hazard area to warn personnel of required control measures.<br>AMG: Observe safety precautions listed in CRG operator manual (TM 9-1430-604-10).<br>If exposure occurs or is suspected, evacuate affected personnel without delay to nearest medical facility for examination by physician. |
| **Launcher Backblast** | **DEATH OR SERIOUS INJURY** | Stay at least 90 meters from launcher at all times. Alert TCO before approaching or working in the vicinity of a launcher. |
| **Toxic Materials**<br>(1) **Beryllium**: Inside various RS, PAC–3 missile, and repair parts<br><br>(2) **Carbon Monoxide** and **hydrochloric acid** in PAC-3 missile exhaust<br><br>(3) **Potassium Hydroxide** in PAC-3 missile silver-zinc thermal battery<br><br>(4) **Lithium** in PAC-3 missile lithium thermal battery | **Serious Injury** | Avoid exposure to toxic materials.<br>If breakage occurs during handling, avoid contact with skin or inhalation of small particles of toxic materials, If contact occurs, wash affected parts with soap solution and rinse thoroughly and dry. Observe safety precautions listed in the respective operator manuals. |

**Table E-1. Special Hazards (Con't)**

| HAZARD | ADVERSE EFFECTS | ACTIONS (REMEDIAL OR PREVENTATIVE) |
|---|---|---|
| **High noise** (RS, ECS, ICC, EPP, EPU, CRG, LS) | Irreversible hearing loss may result from long term exposure | Wear approved ear protection when working within 30 Feet (10 meters) of operating equipment or Within 800 feet (244 meters) of LS during missile launch. |
| **High voltage/current** (Some components of ECS, ICC, RS have voltages greater than 500 volts) | **DEATH ON CONTACT** | Work with someone familiar with operation & hazards Of equipment and capable of providing first aid. If possible, shut off power before beginning work. Ground parts before touching. |
| **Thermal hazards** (Some components of system Major items have temperatures Greater than 140 degrees F) | **SEVERE BURNS** | Wear protective gloves when performing maintenance on equipment that is hot. |
| **Radioactive material** (Some RS electron tubes contain radioactive tritium that may pose hazard if tube is Broken and personnel are cut /exposed) | **RADIATION POISONING, POSSIBLE DEATH** | If tube is broken, contact local radiation protection officer. If victim was exposed to radiation or cut, transport victim to physician immediately. Return tube for disposal as radioactive waste. Refer to RS operator manual (TM 9-1430-601-10-1) for more detailed treatment, cleanup and disposal instructions. |

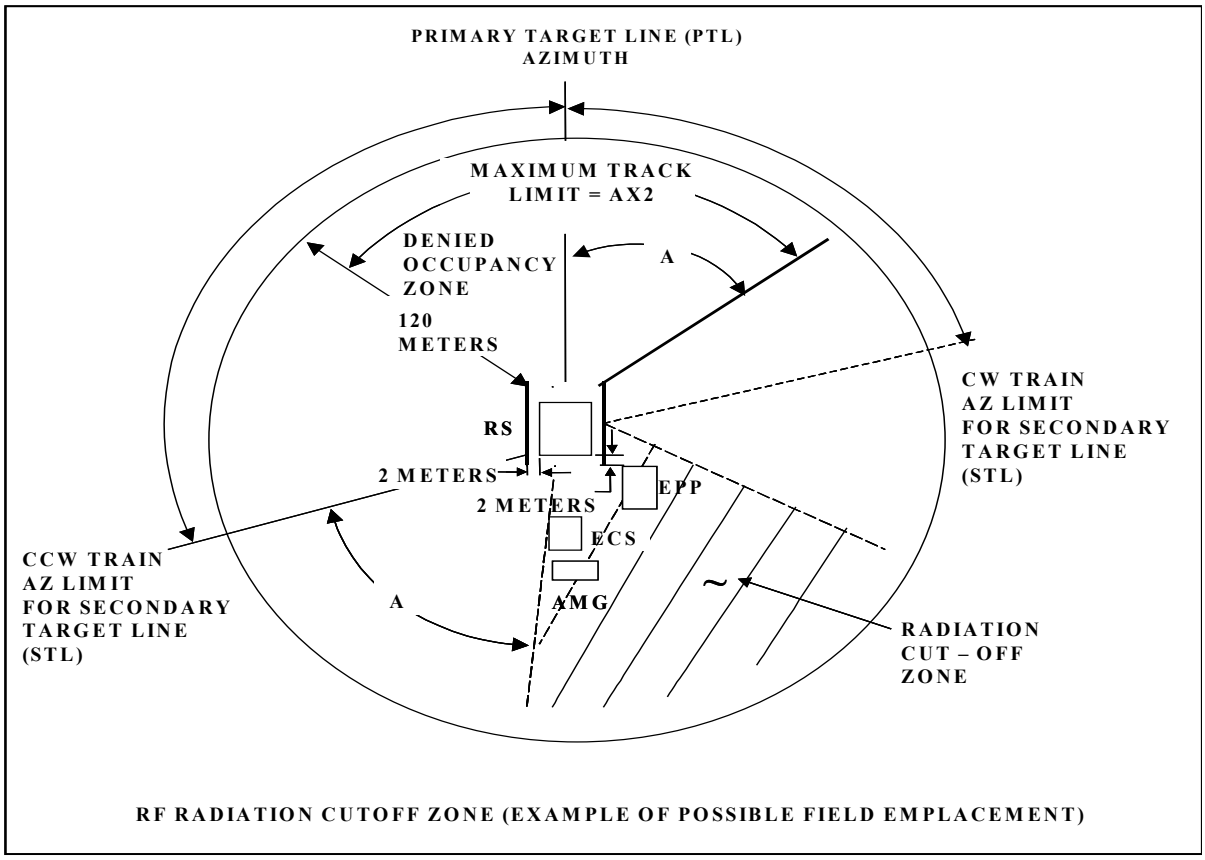



**Figure E-1. RF Radiation Hazard**

## VEHICLE MOVEMENT AND CONVOYS

E-8. Vehicle movements and convoys require leaders to think about safety. The following list is not comprehensive, but is meant to be a start for building a complete safety list for movements:

- Basic issue items must be on every vehicle in convoy.
- Ancillary equipment (example drip pans, tone down, chock blocks, etcetera) must be properly secured to prevent falling off and creating a road hazard.
- Drivers and assistant drivers must perform before-, during-, and after-operation PMCS with each movement.
- Drivers must be trained to drive in adverse weather (ice, snow, fog, and rain), in difficult terrain, and under blackout conditions.
- Drivers must be briefed on the route and observe proper speeds, following distances, rest periods and signals. They must also be briefed on hazardous areas or conditions that may be encountered.
- Drivers must be provided with adequate rest (8 hours rest for each 10 hours of driving a tactical vehicle within a 24-hour time period).
- Drivers must be briefed on what to do during emergencies (example, tire blow out, overheating, other types of breakdown).

- Assistant drivers must ensure that he/she is alert and serves as the driver's second set of ears and eyes to prevent road hazards.
- All vehicle occupants must use available seat restraints.
- Ground guides must be used when appropriate.
- Sleeping in, under, and or near running vehicles is prohibited, as death may result due to carbon monoxide poisoning or accidental movement of the vehicle.
- Fire drills must be practiced on all vehicles.
- Equipment and soldiers cannot be transported together in the cargo bed of a truck.
- Troop safety strap is required when carrying soldiers in the cargo bed.

## AMD TASK FORCE SAFETY

E-9 When Patriot is deployed (collocated) with THAAD in an AMD Task Force, Patriot operator and maintenance personnel must be aware of the THAAD radar RF-radiation and launcher backblast hazards. The radar RF-radiation ground and "no-fly" danger zones are shown in Figure E-2. Personnel should stay out of the ground danger zone, and friendly aircraft should be alerted to stay outside of the "no-fly" zone.

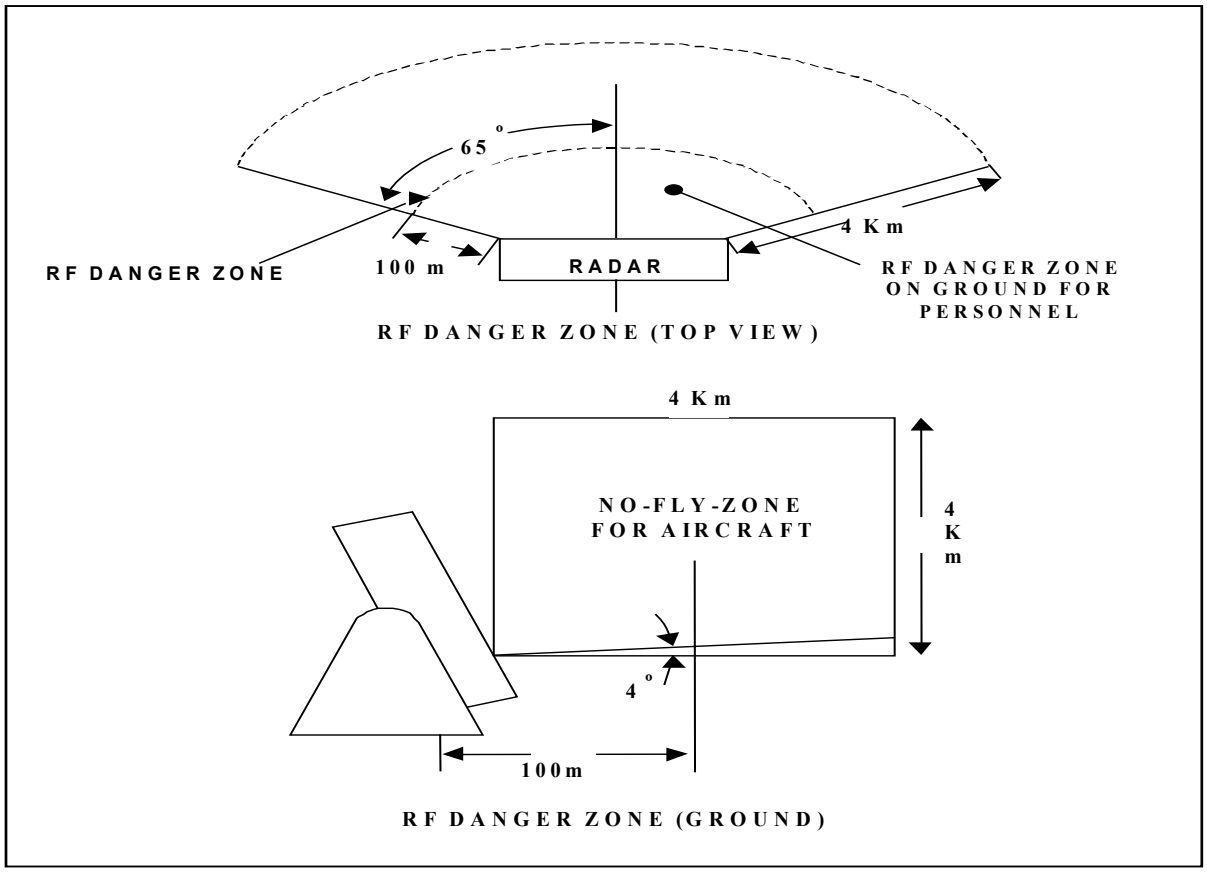



**Figure E-2. THAAD Radar RF Hazard Distances**

E-10. The launcher backblast hazard area for THAAD is equal to Patriot's. For example, personnel must stay at least 90 meters from the THAAD launcher to avoid being injured by the backblast. To preclude hearing damage, personnel must stay at least 185 meters from the launcher if they are not wearing protective equipment.

## Appendix F

# Transportability

This appendix describes Patriot system transportability requirements. It begins with an overview of rail, sea, highway, and air transportability, and then describes airlift requirements for deploying a minimum engagement package (MEP) into a theater of operations. The appendix also describes special air transportability requirements for selected Patriot major items transported on C-5 and C-141 aircraft. General load plan diagrams for the C-5 and C-17 are also included.

## TRANSPORTABILITY OVERVIEW

F-1. The Patriot system and its support elements must be rapidly deployable and transportable via rail, sea, highway (including off-road), and air without sustaining damage. All vehicles and other components, shipped crated or uncrated, must incorporate lifting and tie-down features per MIL STD-209. Comprehensive details can be found in transportation manuals FM 4-01, FM 4-01.9, FM 4-01.12.

### RAIL TRANSPORT

F-2. Patriot is capable of movement on the Passe-Partout International (PPI) loading gauge. Separation of tractors and trailers is acceptable for clearance of the PPI gauge requirement. Rail transport of military equipment on the railway network of Belgium, Denmark, France, Germany, Italy, Luxemburg, and the Netherlands is regulated by STANAGs 2832 and 2175. In NATO countries, Patriot components and vehicles, when dismounted and shipped as separate loads, will clear the PPI gauge. Therefore, these items would be categorized as ordinary transport equipment, requiring only a load study to select appropriate flatcars and determining shipping procedures. In the road march configuration, however, most Patriot major items fail to clear the PPI gauge. Accordingly, movement will be categorized as exceptional transport, requiring a load study and a traffic study, to develop Patriot's routing maps through Europe. Advanced rail planning and routing must be coordinated and verified by individual host nations before USAREUR deployment. This is an USAREUR staff responsibility.

### SEA TRANSPORT

F-3. Transport aboard cargo ships and landing craft of the LCM-8 class is possible. Tractors and trailers may be separated; however, off-loading of equipment modules is not acceptable for movement aboard the LCM-8 in view of the requirement that the equipment be landed in a service-ready condition. No problems are anticipated in transporting Patriot by the marine mode. Patriot items are readily transportable by break-bulk ships, barge carriers (lighter aboard ship-LASH and Seabee) and roll on/roll off (RO/RO) ships. Although Patriot's major items are not self-contained, most can be

loaded on special flat rack containers if transport by container ships is necessary. Patriot can be transported in the logistics over the shore (LOTS) environment, provided the system components are dismounted from the transporter vehicles, as necessary, to achieve compatibility with Army barges. Patriot is readily transportable, as required, by LCM-8 provided the M983 is disengaged from the M860A1 semitrailer and transported separately.

## HIGHWAY TRANSPORT

F-4. Patriot vehicles must be reduced to a height of less than 142 inches in the self-propelled travel configuration to allow unrestricted movement on worldwide highways and bridges. Off-loading of the GMs is acceptable to meet this requirement. For example, for highway movement in USAREUR, all Patriot vehicles exceed width allowances. The M983/860A1 tractor-semi-trailer used to transport the RS and LS also exceeds length limits. The amount of excess, however, is not significant. A movement credit (clearance) will be needed from the transportation movement officer (TMO) at the movement origin. He will accomplish necessary coordination with host nation authorities. Hence, highway movement of the Patriot system can be expedited through advance transportation planning.

## AIR TRANSPORT

F-5. Air travel is the only transportation method that meets world situations requiring immediate response. Air movement of units requires planning at all command levels. Units must be trained to skillfully execute an air deployment.

F-6. The Patriot system is transportable aboard several heavy transport aircraft including the C-17, C-141, and C-5A. For a given deployment, the choice of transport aircraft will depend upon METT-TC and aircraft availability. Because of their superior airlift capacity, the C-5 and C-17 are preferred for deploying a Patriot MEP into theater. Load planners must consider the characteristics of each aircraft. These characteristics include–

- The size of the cargo door and its location and height above the ground.
- The size and shape of the cargo compartment.
- The strength of the aircraft floor.
- The location, number, and type of seats available for airlifting troops.
- Aircraft configurations.

F-7. Special loading considerations must be observed for some Patriot major items on certain aircraft. Some of the considerations for the C-5 and the C-141 aircraft, which include loading restrictions, special tie-down provisions, and special lifting and handling equipment requirements, have been described in this appendix.

F-8. No Patriot items except the missile are internally transportable by Army helicopters, although the CH-47 and CH-50 helicopters can transport several components, such as the ECS and ICC shelters, as external loads.

## C-5 CHARACTERISTICS

F-9. The C-5 is a high-winged, long-range, heavy-lift transport aircraft. Its primary function is to airlift outsized cargo. The troop compartment is in the upper deck area on the C-5 aircraft. It is a self-contained compartment with a galley, two lavatories, and 73 available passenger seats. An additional 267 airline seats may be installed on the cargo compartment floor if needed.

F-10. Special features of the aircraft are its ability to load/unload from either end of the cargo compartment. A vehicle can actually be driven through the aircraft. C-5s can deliver approximately 150, 000 lbs of cargo.

## C-17 CHARACTERISTICS

F-11. The C-17 is a high-winged, long-range, heavy-lift four-engine turbofan transport aircraft. It is designed to replace the C-141 fleet as the airlift workhorse. The C-17 has approximately the same wingspan as the C-141 but can carry twice the payload. It can deliver the same outsize equipment as the C-5. The C-17 is capable of landing in small airfields previously restricted to the C-130.

F-12. The C-17 does not have a separate passenger compartment. However, it has 54 side-facing seats permanently installed for passenger use in the cargo compartment. These sidewall seats do not affect the cargo area dimensions. The C-17 has the ability to land on short runways with anticipated payloads up to 154,000 pounds, which enables delivery of equipment directly to short airfields.

## MEP AIR TRANSPORTABILITY

F-13. The basic MEP consists of an ECS, radar, two launchers, SRPT, HMMWV's with trailers, EPP, fuel tanker, GMT, PAC-2/PAC-3 missiles or both, and sufficient supporting equipment, supplies, rations and personnel to sustain 24-hour operations for 15 days METT-TC dependent. Note: The basic MEP is deployed into the theater using five C-5A or seven C-17 aircraft and can be employed to defend critical lodgment assets. The number of PAC-2/PAC-3 missiles deployed with the MEP will vary according to the threat, each launcher will have a full load of missiles plus one reload.

F-14. The MEP should be considered a starting point only for planning, and organization tailorable to METT-TC. The diagrams for the allocation of MEP components should only be used for guidance with possibilities of how the C-5 and C-17 might be loaded. Considerations should be made for vehicle operator crews and their gear to be transported in the same aircraft as their assigned equipment. This provides a fail safe for immediate unloading and reloading capabilities when situation dictates the rapid movement of equipment.

F-15. A Patriot MEP consists of the major items, equipment, and personnel as shown in Figure F-1. The allocation of MEP components for a C-5A aircraft is shown in Figure F-2. MEP components for the C-17 are shown in Figure F-3.

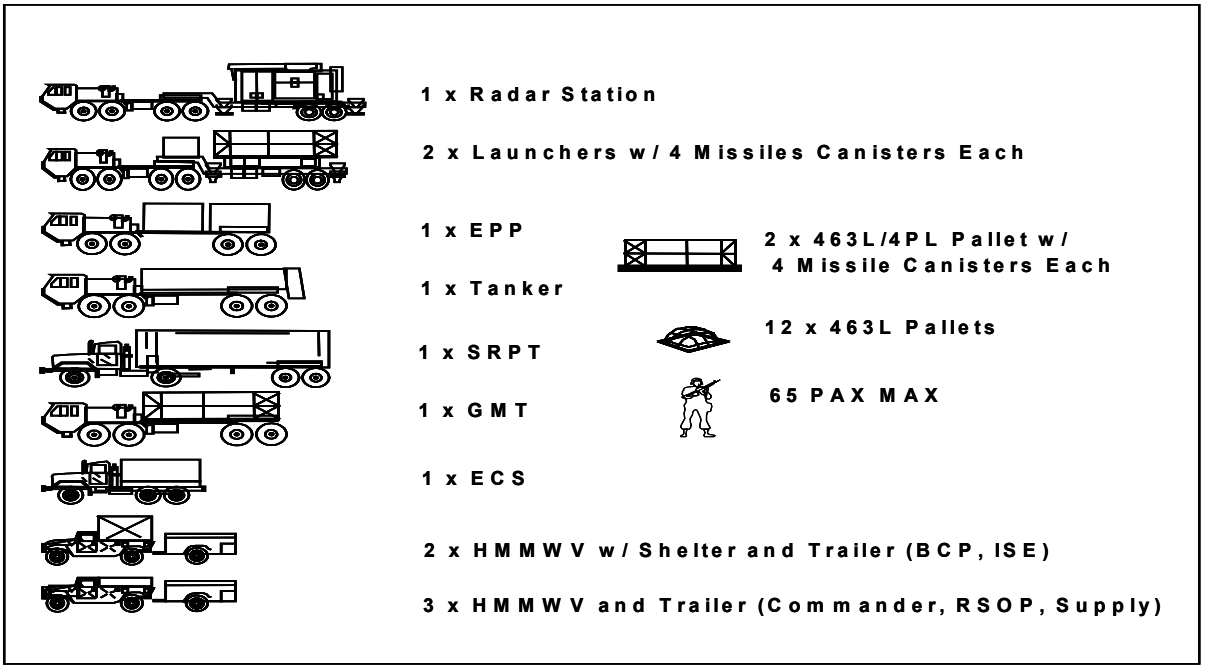
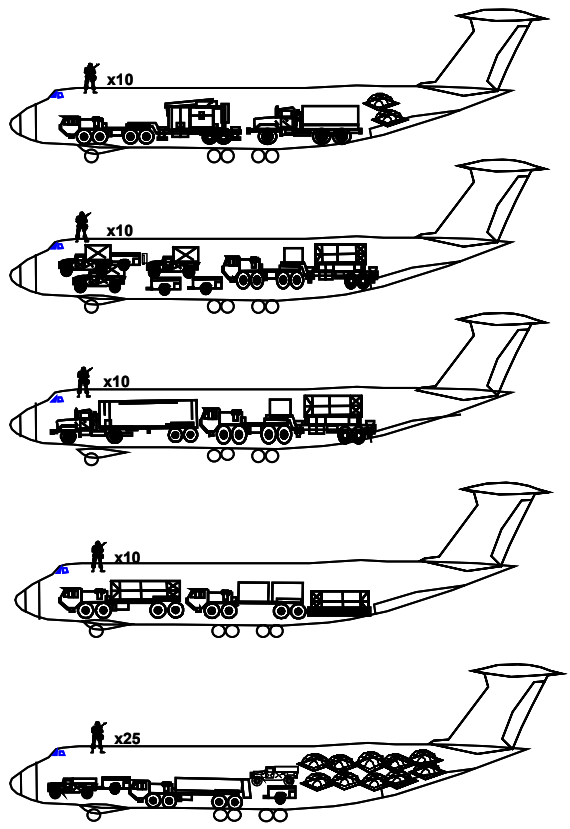



**Figure F- 1. Patriot Minimum Engagement Package**




| | | |
|---|---|---|
| ECS | 37,780 | lbs |
| 10 PAX (@ 210) | 2,100 | lbs |
| Radar Set (-53) | 78,230 | lbs |
| 2 x 463L Pallet | 9,000 | lbs |
| Total | 127,110 | lbs |
| Launcher w/4 ms (PAC-2) | 82,010 | lbs |
| BCP | 11,120 | lbs |
| ISE HMMWV | 10,300 | lbs |
| RSOP HMMWV | 8,880 | lbs |
| 10 PAX (@ 210) | 2,100 | lbs |
| UST Trailer | 5,016 | lbs |
| 2 x Trailer | 5,100 | lbs |
| Total | 124,526 | lbs |
| SRPT w/tractor | 39,390 | lbs |
| 10 PAX (@ 210) | 2,100 | lbs |
| Launcher w/4 ms (PAC-2) | 82,010 | lbs |
| Total | 123,500 | lbs |
| EPP w/HEMTT | 52,910 | lbs |
| GMT w/4 Msls | 56,090 | lbs |
| 10 PAX (@ 210) | 2,100 | lbs |
| 463L/4PL Ms (PAC-2) Pallet | 16,420 | lbs |
| Total | 127,520 | lbs |
| Fuel Tanker ¾ full | 50,925 | lbs |
| 10 x 463L Pallet | 45,000 | lbs |
| CDR HMMWV | 8,880 | lbs |
| HMMWV Troop | 8,880 | lbs |
| 2 x M101A1 Trailer | 5,100 | lbs |
| 25 PAX (@ 210) | 5,250 | lbs |
| Total | 124, 035 | lbs |

**Figure F-2. Allocation of MEP Components on C-5 Aircraft**

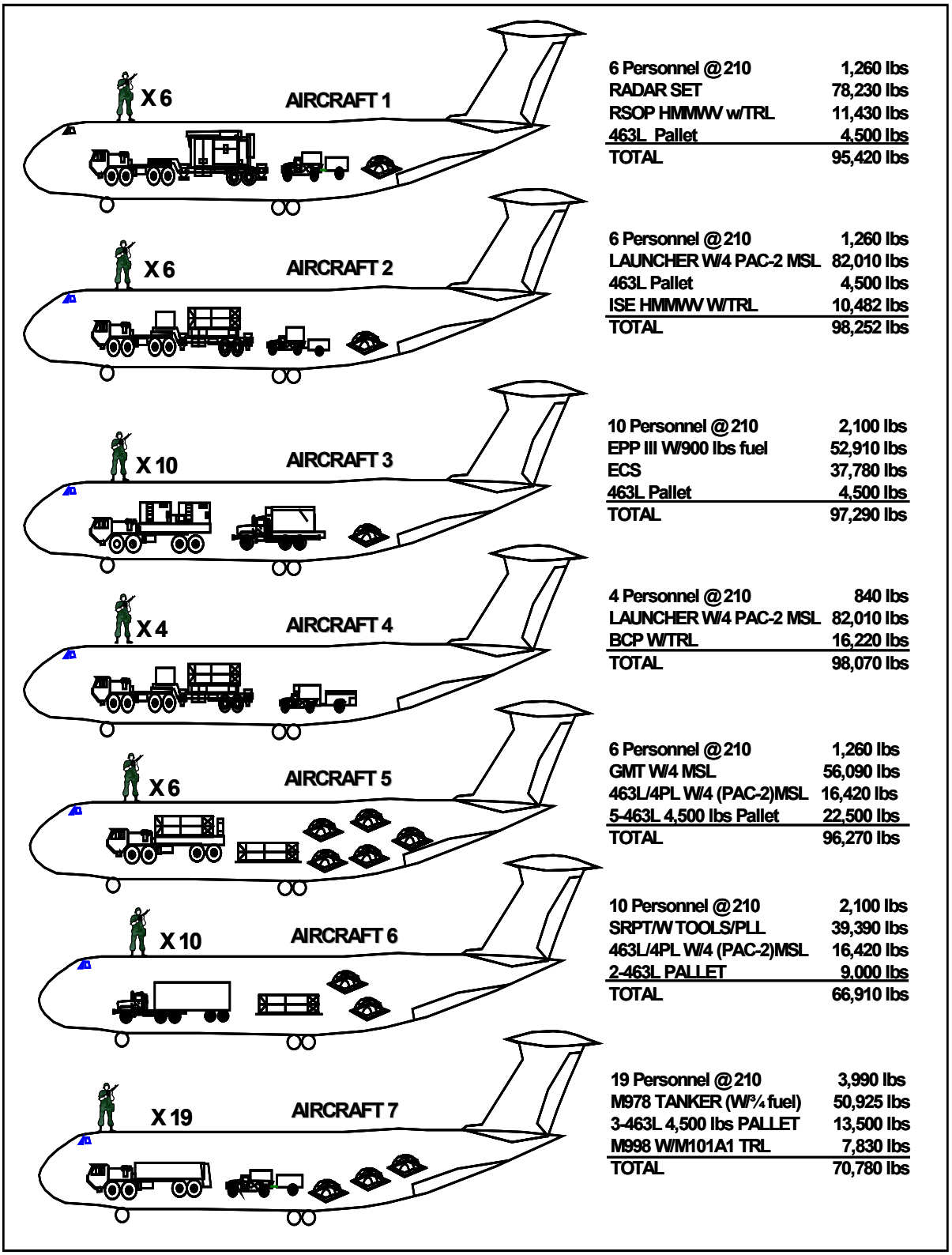



**Figure F-3. Allocation of MEP Components on C-17 Aircraft**

## SPECIAL AIR TRANSPORTABILITY REQUIREMENTS

F-16. This section describes special transport requirements for selected Patriot system items aboard C-5 and C-141 aircraft. These items include the radar set, launching station, HEMTT, flatbed semitrailer, ECS, (mounted and unmounted configurations), ICC (mounted and unmounted), CRG (mounted and unmounted), LRPT, GMT, AMG (mounted and unmounted), EPP III.

### RADAR SET, SEMITRAILER-MOUNTED: SPECIAL REQUIREMENTS FOR C-5

F-17. Because of the size and payload capabilities of the C-5, the RS/M860A1/M983 payload can be located almost anywhere in the cargo area. However, the location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The RS/M860A1/M983 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

### RADAR SET, SEMITRAILER-MOUNTED: SPECIAL REQUIREMENTS FOR C-141

F-18. The RS must be off-loaded from the M860A1 semitrailer for C-141 air transport. The semitrailer cannot be loaded onto the C-141 aircraft without first removing the outriggers. The actuator portion of the outrigger assembly may remain attached to the semitrailer, be raised to a vertical position, and secured using metal strapping with a 2-inch x 4-inch x 96-inch spacer, notched at each end, placed between opposite outrigger actuators. Specialized lifting and handling equipment is necessary to dismount and load the RS for transport in a sectionalized configuration. The RS is loaded on a pallet train consisting of three HCU-6/E cargo pallets married together. One 30-ton crane is required to remove the RS from the M860A1 trailer and load it onto pallets. A 40 K-loader is then required to load the palletized RS into the cargo area of the aircraft. There are no lateral or vertical interference problems between the RS and the C-141 aircraft.

### LAUNCHING STATION, SEMITRAILER-MOUNTED: SPECIAL REQUIREMENTS FOR C-5

F-19. The LSs are remotely operated, fully self-contained units, carrying integral onboard power and up to four guided missiles. The LS is mounted on an M860A1 semitrailer towed by an M983 tractor. The LS/M860A1 semitrailer/M983 tractor combination can be transported by C-5 with or without the missile rounds. Four missile-rounds can be loaded onto the LS for C-5 transport. Because of the size and payload capabilities of the C-5, the LS/M860A1/M983 payload can be located almost anywhere in the cargo area. However, the location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The LS/M860A1/M983 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**LAUNCHING STATION, SEMITRAILER-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-20. The semitrailer cannot be loaded onto the C-141 aircraft without first removing the missile rounds, outriggers, and the launcher's onboard power source, an MEP-113A 15-kilowatt diesel engine-driven generator. The actuator portion of the outrigger assembly may remain attached to the semitrailer, be raised to a vertical position, and secured using metal strapping with a 2-inch x 4-inch x 96-inch spacer, notched at each end, placed between opposite outrigger actuators. Specialized lifting and handling equipment is necessary to dismount and palletize the generator for transport. A crane, forklift, or other lifting device is required to remove the generator from the M860A1 semitrailer and load it onto a pallet. A 40 K-loader is then required to load the palletized generator into the cargo area of the aircraft. There are no lateral or vertical interference problems between the LS and the C-141 aircraft.

**HEAVY EXPANDED MOBILITY TACTICAL TRUCK, 10-TON: SPECIAL REQUIREMENTS FOR C-5**

F-21. The M983 truck can be transported by C-5 without disassembly. Because of the size and payload capabilities of the C-5, the M983 can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M983 within the C-5. The M983 can be driven through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**HEAVY EXPANDED MOBILITY TACTICAL TRUCK, 10-TON: SPECIAL REQUIREMENTS FOR C-141**

F-22. The M983 truck can be transported by C-141 without disassembly; however, the spare tire must be removed from the vehicle in order to load into the C-141. It can be driven into the aircraft, eliminating the use of pallets. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M983 within the C-141. There are no lateral or vertical interference problems between the M983 truck and the C-141 aircraft.

**SEMITRAILER, FLATBED: SPECIAL REQUIREMENTS FOR C-5**

F-23. The M860A1 semitrailer can be transported by C-5 with or without its mission payload. Due to the kingpin’s unusual 3 1/2-inch size, care should be taken not to lose it during loading. Because of the size and payload capabilities of the C-5, the M860A1 can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The M860A1 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

Since the M860A1 semitrailer does not have an on-board mobility source, a prime mover, tow motor, or other suitable handling equipment is necessary to load the M860A1 semitrailer into the C-5 aircraft.

**SEMITRAILER, FLATBED: SPECIAL REQUIREMENTS FOR C-141**

F-24. The M860A1 semitrailer cannot be loaded onto the C-141 aircraft with its mission payload or the outriggers. The actuator portion of the outrigger assembly may remain attached to the semitrailer, be raised to a vertical position and secured using metal strapping with a 2-inch x 4-inch x 96-inch spacer, notched at each end, placed between opposite outrigger actuators. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Since the M860A1 semitrailer does not have an on-board mobility source, a prime mover, tow motor, or other suitable handling equipment is necessary to load the M860A1 semitrailer into the C-141 aircraft. There are no lateral or vertical interference problems between the M860A1 semitrailer and the C-141 aircraft.

**ENGAGEMENT CONTROL STATION, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-5**

F-25. The ECS shelter/M927 truck combination can be transported by C-5 in the road march configuration. Because of the size and payload capabilities of the C-5, the ECS/M927 payload can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The ECS/M927 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**ENGAGEMENT CONTROL STATION, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-26. The ECS shelter must be off-loaded from the M927 carrier vehicle for C-141 transport. The shelter is loaded on a pallet train consisting of three HCU-6/E cargo pallets married together. The M927 must be height reduced by removing the cabin top and windshield for loading into the C-141. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Specialized lifting and handling equipment is necessary to dismount and load the ECS shelter for transport in a sectionalized configuration. One 30-ton crane is required to remove the shelter from the M927 truck and load it onto pallets. A 40-K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the ECS shelter or M927 truck and the C-141 aircraft.

**ENGAGEMENT CONTROL STATION: SPECIAL REQUIREMENTS FOR C-141**

F-27. The off-loaded ECS shelter is C-141 transportable. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Since the shelter does not have an on-board mobility source, cargo-handling equipment is necessary to load it into the C-141 aircraft. One 30-ton crane is required to load the shelter onto pallets. A 40-K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the ECS shelter and the C-141 aircraft.

**INFORMATION AND COORDINATION CENTRAL, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-5**

F-28. The ICC shelter/M927 truck combination can be transported by C-5 in the road march configuration. Because of the size and payload capabilities of the C-5, the ICC/M927 payload can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The ICC/M927 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**INFORMATION AND COORDINATION CENTRAL, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-29. The ICC shelter must be off-loaded from the M927 carrier vehicle for C-141 transport. The shelter is loaded on a pallet train consisting of three HCU-6/E cargo pallets married together. The M927 must be height reduced by removing the cabin top and windshield for loading into the C-141. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Specialized lifting and handling equipment is necessary to dismount and load the ICC shelter for transport in a sectionalized configuration. One 30-ton crane is required to remove the shelter from the M927 truck and load it onto pallets. A 40-K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the ICC shelter or M927 truck and the C-141 aircraft.

**INFORMATION AND COORDINATION CENTRAL: SPECIAL REQUIREMENTS FOR C-141**

F-30. The off-loaded ICC shelter is C-141 transportable. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Since the shelter does not have an onboard mobility source, cargo-handling equipment is necessary to load it into the C-141 aircraft. One 30-ton crane is required to load the shelter onto pallets. A 40-K-loader is then required to load the

palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the ICC shelter and the C-141 aircraft.

**COMMUNICATIONS RELAY GROUP, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-5**

F-31. The CRG shelter/M927 truck combination can be transported by C-5 in the road march configuration. Because of the size and payload capabilities of the C-5, the CRG/M927 payload can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The CRG/M927 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**COMMUNICATIONS RELAY GROUP, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-32. The CRG shelter must be off-loaded from the M927 carrier vehicle for C-141 transport. The shelter is loaded on a pallet train consisting of three HCU-6/E cargo pallets married together. The M927 must be height reduced by removing the cabin top and windshield for loading into the C-141. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Specialized lifting and handling equipment is necessary to dismount and load the CRG shelter for transport in a sectionalized configuration. One 30-ton crane is required to remove the shelter from the M927 truck and load it onto pallets. A 40-K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the CRG shelter or M927 truck and the C-141 aircraft.

**COMMUNICATIONS RELAY GROUP: SPECIAL REQUIREMENTS FOR C-141**

F-33. The off-loaded CRG shelter is C-141 transportable. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Since the shelter does not have an on-board mobility source, cargo-handling equipment is necessary to load it into the C-141 aircraft. One 30-ton crane is required to load the shelter onto pallets. A 40-K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the CRG shelter and the C-141 aircraft.

**TRUCK, M927: SPECIAL REQUIREMENTS FOR C-141**

F-34. The M927 must be height reduced to 91 inches by removing the cabin top and windshield for loading into the C-141. Because of the size and payload capabilities of the C-141, the M927 can be located almost anywhere

in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M927 within the C-141. There are no lateral or vertical interference problems between the M927 truck and the C-141 aircraft.

**LARGE REPAIR PARTS TRANSPORTER: SPECIAL REQUIREMENTS FOR C-5**

F-35. The M977 truck can be transported by C-5 without disassembly. Because of the size and payload capabilities of the C-5, the M977 can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M977 within the C-5. The M977 can be driven through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**LARGE REPAIR PARTS TRANSPORTER: SPECIAL REQUIREMENTS FOR C-141**

F-36. The M977 truck can be transported by C-141 without disassembly; however, the spare tire must be removed from the vehicle in order to load into the C-141. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M977 within the C-141. There are no lateral or vertical interference problems between the M977 truck and the C-141 aircraft.

**GUIDED MISSILE TRANSPORTER: SPECIAL REQUIREMENTS FOR C-5**

F-37. The M985E1 truck can be transported by C-5 with or without a payload of guided missiles. Because of the size and payload capabilities of the C-5, the M985E1 can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M985E1 within the C-5. The M985E1 can be driven through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**GUIDED MISSILE TRANSPORTER: SPECIAL REQUIREMENTS FOR C-141**

F-38. The M985E1 truck can be transported by C-141 without disassembly; however, the missile payload and spare tire must be removed from the vehicle in order to load into the C-141. The crane must be lowered to its travel position in order to meet height requirements. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M985E1 within the C-141. There are no lateral or vertical interference problems between the M985E1 truck and the C-141 aircraft.

**ANTENNA MAST GROUP, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-5**

F-39. The AMG/M942 truck combination can be transported by C-5 in the road march configuration. Because of the size and payload capabilities of the C-5, the AMG/M942 payload can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The AMG/M942 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**ANTENNA MAST GROUP, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-40. The AMG must be off-loaded from the M942 carrier vehicle for C-141 transport. The AMG is loaded on a pallet train consisting of three HCU-6/E cargo pallets married together. The M942 must be height reduced by removing the cabin top and windshield for loading into the C-141. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Specialized lifting and handling equipment is necessary to dismount and load the AMG for transport in a sectionalized configuration. One 30-ton crane is required to remove the AMG from the M942 truck and load it onto pallets. A 40-K-loader is then required to load the palletized AMG into the cargo area of the aircraft. There are no lateral or vertical interference problems between the AMG and M942 truck and the C-141 aircraft.

**ANTENNA MAST GROUP: SPECIAL REQUIREMENTS FOR C-141**

F-41. The off-loaded AMG is C-141 transportable and due to the size and payload capabilities of the C-141, can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Since the AMG does not have an on-board mobility source, cargo-handling equipment is necessary to load it into the C-141 aircraft. One 30-ton crane is required to load the shelter onto pallets. A 40 K-loader is then required to load the palletized shelter into the cargo area of the aircraft. There are no lateral or vertical interference problems between the AMG and the C-141 aircraft.

**ELECTRIC POWER PLANT III, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-5**

F-42. The EPP III/M983 HEMTT combination can be transported by C-5 in the road march configuration. Because of the size and payload capabilities of the C-5, the EPP III/M983 payload can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-5. The EPP III/M983 configuration can be rolled through the C-5 cargo compartment without interfering with the walls or ceiling of the cargo area.

**ELECTRIC POWER PLANT III, TRUCK-MOUNTED: SPECIAL REQUIREMENTS FOR C-141**

F-43. The diesel engines must be off-loaded from the M983 carrier vehicle for C-141 transport. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the payload within the C-141. Specialized lifting and handling equipment is necessary to dismount and load the EPP III for transport in a sectionalized configuration. A 30-ton crane may be used to remove the diesel engines from the M983 HEMTT and load them onto pallets. A 40 K-loader is then required to load the palletized diesel engines into the cargo area of the aircraft. There are no lateral or vertical interference problems between the palletized diesel engines or M983 HEMTT truck and the C-141 aircraft.

**TRUCK, M942: SPECIAL REQUIREMENTS FOR C-141**

F-44. The M942 must be height reduced to 93.7 inches by removing the cabin top and windshield for loading into the C-141. Because of the size and payload capabilities of the C-141, the M942 can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo. Tie-down spacing provisions must also be considered in the location of the M942 within the C-141, There are no lateral or vertical interference problems between the M942 truck and the C-141 aircraft.

**ELECTRIC POWER UNIT II, TRAILER-MOUNTED: SPECIAL REQUIREMENTS FOR C-5 AND C-141**

F-45. The EPU II is C-5 and C-141 transportable and due to the size and payload capabilities of the aircraft, it can be located almost anywhere in the cargo area. The location of the combined CG of the total load must be within the limits of the aircraft for the total weight of the cargo.

## Appendix G

# Reconnaissance, Selection, and Occupation of Position

The purpose of this appendix is to discuss the requirements and general guidelines for reconnaissance, selection, and occupation of position (RSOP) team. RSOP is used to facilitate orderly, rapid, safe movement and emplacement at the designated position. The RSOP team performs its function by reconnoitering and selecting primary and alternate access routes and sites for unit equipment and facilities within the position. The mission of the RSOP team is to select the best terrain and equipment sites that enable the Patriot battery to perform its mission.

## PREPARATION FOR MOVEMENT

G-1. Moving a Patriot unit into a new position requires extensive preparation of the new site. For Patriot units to move and deliver effective air defense fires against all enemy threats they must be sited correctly and rapidly. Patriot units respond to major shifts of friendly or enemy forces by relocating their fire units to new locations. Patriot must reestablish defense of critical assets, respond to changes in mission assignments for survivability, and insure overall AMD integrity after movement.

G-2. Patriot is part of a larger integrated air and missile defense. Conducting an RSOP is usually part of a multilevel operation conducted by the air defense headquarters. The Patriot battalion commander positions fire units based on the mission received from higher headquarters. The term "site" when used in this context specifies an exact area within the selected position. The battalion commander will commonly designate a four or six digit grid coordinate for the new position in which he expects the unit to occupy. At this time, the commander may designate a survey team to go with the RSOP team if needed to provide coordinates and altitudes of the Patriot equipment. Normally, the battery commander will have some leeway in occupying the position, based on his reconnaissance.

G-3. The procedures used to conduct RSOP are SOP items and must be part of every unit's tactical preparation. These procedures must be thoroughly understood and practiced repeatedly by unit personnel. SOPs must cover both day and night movements and occupations of position. They should include vehicle load plans for each method in which a unit might move such as rail, sea, air, and road.

G-4. To maximize Patriot's tactical capability, the reconnaissance must be thoroughly planned and executed. As part of the planning phase for any RSOP, the battery commander will brief the RSOP OIC on the new mission, enemy and friendly situations, and proposed location. A map reconnaissance is performed to determine primary and secondary routes of march.

G-5. Although the Patriot missile system is fully mobile with all tactical equipment mounted on wheeled trailers or vehicles, Patriot equipment is both oversized and heavy. Road surfaces, bridges, and terrain that must be

negotiated may limit the route taken by the Patriot because of the size and weight of the equipment. See Appendix B; table B-2 for weight and dimensions of Patriot equipment. By doing a route reconnaissance, as well as a map reconnaissance, these potential obstacles can be overcome with good planning and preparation prior to the battery's movement.

G-6. To minimize movement time, all key personnel must be able to do the reconnaissance, selection, organization, occupation, and movement tasks quickly and efficiently. With adequate training, many of the actions of the RSOP team become "second nature" and are accomplished routinely. The time required for unit movement is out-of-action time. The longer a unit is not performing their assigned mission, the greater chances they have in being surprised by the enemy. The Patriot unit must be able to move and regain an operational capability at a new position in the shortest possible time. This is to limit the time Patriot is out of the air battle.

## METHODS OF RECONNAISSANCE

G-7. The three methods by which the battery commander and platoon leaders may conduct a reconnaissance are map, air, and ground. Any reconnaissance begins with a map inspection. Potential position and routes to the new position can be chosen. The best reconnaissance is one that uses a combination of all three. To maximize the tactical benefit, the reconnaissance should be thoroughly planned. Reconnaissance considerations include—

- Primary route/alternate route (if not dictated from higher headquarters).
- New position/secondary position.
- Overhead clearances.
- Bridge classification.
- Route trafficability.
- Towns or cities that the convoy will travel through.
- Roadway width.
- Harbor/hide areas along the primary and secondary routes.
- Proximity to built-up areas.
- Major terrain (mountains/deep valleys).
- Potential ambush sites along the route of march.

G-8. Air reconnaissance may not be feasible due to availability of aircraft, but ground and map can still be accomplished. The surface conditions of the route and position cannot be accurately determined for example, (ground may not be able to support the weight of the equipment).

G-9. Map reconnaissance should be carefully considered. This method is very fast and allows unsuitable routes to be eliminated. A major disadvantage is that terrain and other features may have been altered, that is (a bridge may no longer exist).

G-10. Ground reconnaissance is the best and most often used method. While this is the slowest method, it is the most accurate and most reliable. Routes can be physically examined and suitability of routes can be physically

examined. The true condition of the terrain is especially critical if the surface has been affected by enemy action and or weather conditions.

## ESTABLISHING A TEAM

G-11. The reconnaissance party is composed of a sufficient number of personnel to accomplish the RSOP mission and within constraints imposed by personnel availability and concurrent missions. The RSOP party organization is established in unit SOPs to fit most tactical situations. The actions taken to form up the RSOP party must not affect the current mission of the unit.

G-12. It is recommended having 15 personnel on the team. Individuals may be on more than one team, and some teams may have concurrent activities within the RSOP team, such as NBC and communications personnel. At a minimum one RSOP crewmember should be qualified as a combat lifesaver with a complete combat lifesaver bag with him at all times. The team should consist of an officer in charge (OIC), and a noncommissioned officer in charge (NCOIC.

### Officer in Charge

G-13. The OIC has overall responsibility for the RSOP. His job is to train a dedicated, technically proficient, and motivated RSOP team. The OIC is normally a commissioned officer TD/TCO, but may be a senior NCO. He ensures that the party is properly briefed and that all equipment and supplies are loaded in accordance with the load plan. The following are OIC responsibilities—

- Conducts a map recon with the commander and plans primary and alternate routes accordingly.
- Determines the suitability of the proposed position and advises the battery commander on suitability of routes-of-march and battery position as soon as possible.
- Responsible for detailed battery layout.
- Determines the ISLBs (PTL and STL) and site of radar.
- Briefs the battery commander and fire control platoon leader, upon arrival, as to the site layout and any unusual circumstances.
- Supervises the preparation of RSOP equipment for the next move.

### Noncommissioned Officer in Charge

G-14. The NCOIC assists the OIC in training the RSOP team. The NCOIC is normally a TDA/TCA but may be a senior NCO from another section. Upon movement notification, he ensures that all equipment is present in accordance with load plans, that the RSOP vehicles are mission capable, and that all team personnel are present, and have all prescribed equipment. The NCOIC coordinates with the PADS team if needed as a backup capability. The following are NCOIC responsibilities—

- Ensures radio checks are accomplished with the battery command network prior to departure.

- Ensures NBC and mine sweeping equipment is operational prior to departure.
- Supervises the FC, LS, and security crews of the RSOP team on site, determines and marks all the sites for support equipment and platoon areas, and assists in emplacing communications equipment.
- Upon arrival at the new position, ensures emplacement of all ground rods for major pieces of equipment IAW with unit SOP.
- Ensures hot-loop communication lines from the ECP to the RSOP team are established at the new position.
- Upon arrival of the battery, briefs the 1SG and platoon sergeants as to the battery layout and any unusual circumstances.
- Ensures preparation of RSOP equipment for the next move.

## RSOP TEAM

G-15. The unit commander determines that the number and types of teams necessary to clear and secure a new area are based on METT-TC. Teams should be proficient in operating the equipment necessary to perform their function. These teams are only for guidance when establishing the RSOP team. The following are team members and their responsibilities—

- ***RSOP OIC driver–*** Sets up an OE-254 and maintains communication with the battery and battalion; sets up and operates the battery jump CP; drives the ground rounds for the CP.
- ***Fire control crew–*** Stakes out each piece of system equipment and drives all ground rods for the system equipment.
- ***Security team–*** Upon arrival at the new position, secures and establishes a light security screen around the area. Everyone is a member of this team. The light security screen may be in the form of strong points placed in the four cardinal directions or along likely avenues of approach. The security team will maintain communications with the RSOP OIC via TA-312 landline.
- ***NBC team–*** In an NBC environment, this team emplaces the M8 chemical alarms and conducts M256 kit readings at suspected contaminated areas along the route-of-march, and at the new location. If the situation does not warrant, these personnel assist other teams in preparing the site.
- ***Minesweeping team–*** If the tactical situation warrants, this team operates the mine detector as part of clearing suspected contaminated areas along the route-of-march or when the initial entry into areas is suspected of being mined. If the situation does not warrant, these personnel assist other teams in preparing the site.
- ***Ground guides–*** Prior to the arrival of the main body, these personnel assist the OIC and other teams with the layout of the site. This team assists the battery elements in a smooth initial occupation. One ground guide per vehicle is designated to meet that element at the dismount point upon arrival.

- ***Launcher crew*** – Drives all stakes and ground rods for the launchers and lays out the fiber cable to the ECS site. Performs security team functions.

## SURVEY TEAM

G-16. The primary mission of the survey section is to provide the radar and launchers in each firing battery with timely survey control executed to prescribed accuracies. Survey teams ensure that the radar and launchers are precisely located and aligned to establish initialization accuracy. They are responsible for placing the FUs and supporting elements on a common grid so that higher headquarters can track their exact location.

G-17. A battalion survey section consists of nine soldiers. There is one section chief that is an E-6 and four survey teams consisting of two soldiers per team. Each team has a HMMWV as a prime mover, which is equipped with an AN/VRC-90 CNR. Each survey team is also equipped with an AN/USQ-70 position and azimuth determining system (PADS). The required data are determined in the following order of priority—

- Orientation azimuth for the radar, north reference point (NREF), and azimuth mark.
- Coordinates and altitudes of the radar.
- Coordinates, altitudes, and orientation azimuth for the launchers.
- Collect, evaluate, and disseminate all available survey data that might be used by the battalion.
- Maintain maps and files of survey data for the battalion area of operation.

G-18. Since the Patriot system uses true north as a reference, and battery personnel use grid azimuth to perform hasty surveys, both grid and true azimuths should be provided to the firing batteries. To ensure that survey data meets the required accuracy, the survey teams will establish all surveys.

G-19. On receipt of the battalion OPORD, usually four to six hours before the battery movement, the RSOP officer, or the survey section chief will issue a warning order to one of the survey teams The survey teams, when needed, should be included in the RSOP party so that the necessary survey operations can be started immediately after the new sites are selected. Because of the distance to be traveled, the PADS may be initialized before departing or initialization may be performed near the new position if survey control is available at the new position. The survey will be performed in accordance with the battalion commander's guidance.

## LOAD PLANS

G-20. After the team has been established and individual duties have been assigned, the necessary equipment according to the MTOE needed to accomplish the mission is then loaded onto the vehicles in accordance with the load plan. This load plan is part of the unit's SOP. A load plan prescribes efficient loading of personnel and equipment for movement. Each vehicle will

have one. A good load plan ensures that a unit will move into the new position with all its equipment. The load plan for a vehicle is that the equipment most essential to the mission is loaded last. The load plan should be recorded and graphically portrayed. Load plans should be identical between like sections within the same battery and battalion.

## MOVEMENT WARNING ORDER

G-21. The team is ready for their first mission when the initial steps needed to put an RSOP team together have been completed. The first step in preparing the RSOP team for their mission is for the OIC to receive the movement warning order. The warning order tells the RSOP OIC that movement is expected. While the NCOIC is assembling supplies, teams and all necessary equipment, the OIC and the commander are planning routes using a map reconnaissance. Routes must avoid NBC contaminated areas and obstructions. Changes in the initial map reconnaissance may need to be adjusted accordingly.

G-22. The movement warning order may be followed by the movement order. The movement order is disseminated from higher headquarters down to the battery level. This movement order will include more information that the RSOP team needs to know. The headquarters controlling the movement of the battery directs the essential elements of the movement–when, where, and how. The general location of the new position will be given to the team prior to departing the field site. This location will also include —

- Sectors-of-fire.
- No later than to be in position ready to fire.
- Routes and any special instructions.
  - danger areas
  - intelligence
  - alternate positions
  - movement techniques

G-23. A unit begins preparations to depart the current area as soon as it receives the MWO. The sequence used to clear the area may vary based on the situation. However, the initial focus is on mission-essential equipment. Perimeter security must not be compromised in the preparation for movement.

### ROUTE RECONNAISSANCE

G-24. Routes must be analyzed, and time and distance must be taken into account prior to movement. Moving the battery over long difficult routes require well-planned, coordinated movement orders and unit SOPs.

G-25. After the map reconnaissance has been completed, the OIC now conducts a route evaluation to determine if the selected route is acceptable. This is conducted en route to the new position. The OIC also ensures that the designated harbor/hide area is adequate. A harbor/hide area is off the main supply route (MSR). It is large enough for the entire main body, has adequate

cover and concealment, and is defendable for short periods. It is halfway between the old and new position, terrain permitting.

## GROUND/SITE RECONNAISSANCE

G-26. If the tactical situation warrants NBC protection, the RSOP OIC will determine the MOPP level for the team. NBC contaminated areas should be avoided when possible. All RSOP personnel dismount upon reaching the access road that leads to the new position. The OIC notifies the battery commander of arrival at the proposed position. At least two soldiers stay to secure the vehicles and monitor the radio. The OIC or NCOIC gives them a five-point contingency plan that includes the following information:

- Who is going with the OIC/NCOIC?
- How long the OIC/NCOIC element will be gone?
- What to do if the OIC/NCOIC element does not return?
- What to do if the element becomes engaged?

G-27. If the tactical situation warrants, two security team members use the mine detector to clear the access road, and two personnel conduct a radiological and chemical survey. The entire team then moves tactically to the new position looking for signs of enemy activity. Upon reaching the new position, the RSOP OIC/NCOIC places a two-man team at what they believe to be the 6 o'clock position; this becomes the dismount point.

G-28. Reconnaissance determines if the position will be selected. The OIC considers many requirements and factors in determining the acceptability of the tentative position. The site selected for the radar set provides the basis for the siting of other major items of equipment. Once the OIC determines that the position is suitable for the radar, he informs the battery commander over secure radio. If the position is unacceptable, the OIC reconnoiters alternate positions. He may have authority to reconnoiter positions within a given distance to find a suitable position. The OIC uses the following criteria to determine if the site is acceptable:

- Is the radar field-of-view unobstructed?
- Is the fire control area 30 meters by 35 meters and less then a 10-degree slope?
- Is it large enough to accommodate unit vehicles and equipment?
- Is the internal road network sufficient?
- Is there line of sight for remote launchers (Phase 1 and Phase 3)?
- Does it have a firm, well-drained level surface for maintenance and dispersion of vehicles?
- Is the location defendable?
- Does it have a minimum of one entrance and exit?
- Does it have natural cover and concealment?

### PRIMARY POSITIONS AND ALTERNATE POSITIONS

G-29. The primary position is one from which the battery will accomplish its assigned air defense mission. Alternate position is one in which the unit

moves to in case its primary becomes untenable (overrun by enemy forces, contaminated or destroyed by natural forces). The alternate position must meet the same requirements as the primary.

## LAYING OUT THE POSITION

G-30. The RSOP OIC lays out the position. The OIC may use any available resources to diagram a position layout. The diagram ensures that all members of the team know exactly where each piece of equipment is going. This diagram can also be used as a reminder to show the cable lengths of the fire control equipment, prior to setting ground rods. Figure G-1 shows a possible layout for the fire control section and the distance between each piece of equipment. Selected positions are best available for fields of fire, communications, accessibility, and survivability. Specific considerations for position layout include: up range, down range (launching stations), command post, maintenance area, fuel tanker, troop area, mess facilities, latrines, and ammunition storage. The area required for deployment of the battery is about one km squared.

G-31. The most critical pieces of equipment to put in position first are the radar, ECS, EPP, AMG, and the launching stations for the battery. Once the individual sites are selected for each piece of equipment, the ISLB data needs to be shot. RSOP team members are responsible for determining the 5-point ISLB for the RS. Prior to the fire unit emplacing and visibility permitting, the M2 aiming circle is used to collect needed data. There are step-by-step instructions included in FM 3-01.87 to determine the ISLB. Practice on the M2 aiming circle should be done in advance to the unit's movement to ensure all steps are done correctly and efficiently.

## EQUIPMENT CONSIDERATIONS

G-32. Primary areas selected in a new position are those for the fire control platoon, launcher platoon, and battery support elements. In addition, sites are selected for security forces and Stinger teams.

### FIRE CONTROL PLATOON

G-33. The heart of the Patriot battery is the fire control section. The fire control section consists of an ECS, AMG, RS, and EPP. When the RSOP team sets up the big four there are many considerations that must be taken into account, both for safety of soldiers and equipment. Figure G-1 shows a possible fire control emplacement. Equipment should be positioned based on the length of data, power cables, and the terrain that is available.

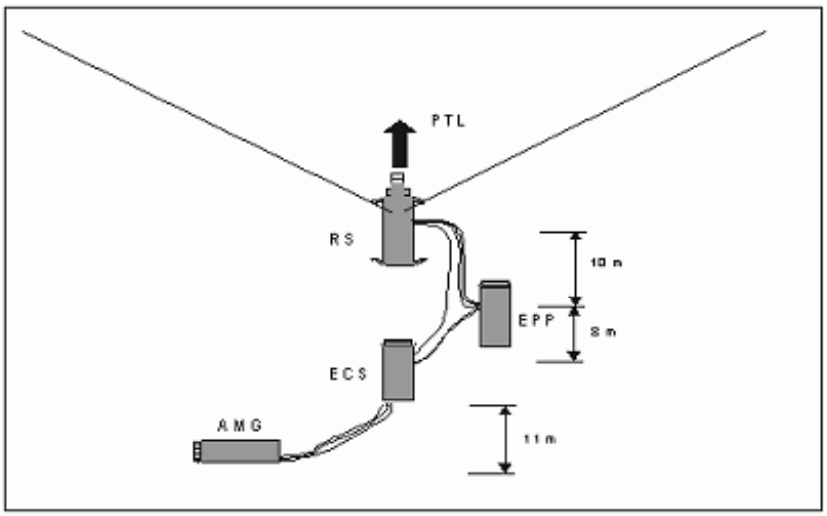



**Figure G-1. Fire Control Section Emplacement Configuration**

### Radar Set Considerations

G-34. All equipment must be positioned to the rear of the RS thereby keeping them out of the primary and secondary search sectors. The radar set requires an area of 30 to 35 meters to operate in. Engineer tape may be used to sector off the hazard area of the radar. Radar set must have an unobstructed field of view to eliminate radiation hazards to personnel, equipment and to prevent clutter. A radiation hazard exists in the track sector 120 meters forward of the RS. Considerations must be made as to where the radar and its cables are positioned as to prevent power and data cables from being run over by vehicles. Other considerations include terrain slope, it must not exceed 10-degree roll and cross roll from where the radar is emplaced.

### Electrical Power Plant Considerations

G-35. The EPP must be positioned to the rear right or rear left of the RS. The terrain for the EPP must not exceed 10-degree roll and cross roll. The EPP must be positioned to accommodate easy access for refueling and placed within the limit of cable lengths.

### Engagement Control Station Considerations

G-36. The ECS is positioned to the rear of the radar set and in a concealed area, if possible, orienting the ECS door away from the radar set to minimize the RF and noise hazards. It must be placed where the cables can reach the radar and the EPP, but not where any vehicles will run over the cables. Additionally, the ECS is connected by a 26-pair cable or field wire to the battery command post.

### Antenna Mast Group Considerations

G-37. The AMG is situated to provide line-of-sight communications to the ICC and adjacent firing batteries. The AMG, due to its stringent requirement for level terrain, is the most stringent piece of Patriot equipment to emplace. The AMG must be level within ½ degree in roll altitude and 10 degree in cross roll.

## LAUNCHER PLATOON

G-38. The minimum distance from RS to LS is 120 meters, while its maximum distance from RS to LS is 1200 meters. The launchers terrain slope must not exceed 10-degree roll and cross roll. Due to the back blast danger area, the area directly behind the launchers is 90 meters minimum. The missile back blast danger area is 90 meters directly behind the launchers. This area must be kept clear of personnel and equipment.

G-39. There are three separate locations where launchers may be positioned to counter the threat: local launchers, RL-1 remote launchers, and RL-3 remote launchers.

- Local launchers are mainly used for air battle and self-defense against ASMs and TBMs.
- Remote launchers Phase-I are located up to 10 kilometers in front of the radar and are employed evenly spaced on both sides of the PTL, METT-TC dependent.
- RL-3 launchers are mainly used to counter the TBM threat as a launcher farm. A remote launcher farm must consist of a minimum of two enhanced launcher electronic system (ELES). With each launcher farm, there will be CRG with a LCS configuration to provide communications and to function as a launch control station.

G-40. Siting guidance for launchers is within the search and track sectors. (Caution: sites must be flexible when sector bounds are adjusted). Minimum separation distance between launchers is 90 meters. Local launchers may be emplaced using a lazy 'W' formation and evenly distributed (METT-TC dependent) along the PTL/STL. The launcher PTL orientation is determined during defense design planning and must be pointing towards the center of the threat launch location NAIs. The launchers must be pointed directly at a TBM threat to achieve the highest possible Pk. Whenever possible, orient launchers in pairs towards the threat TBM launch locations, this is for redundancy. RL-3 launchers must be emplaced within 10 degrees of the PTL/STL.

G-41. Fiber-optic cables for local launchers run between the radar and the up-range launcher area. The NCOIC needs to ensure that no vehicles are driving over or near the launcher's area to prevent damage to the cables by fuel trucks and other vehicles. Considerations should be made whether to bury the cables, sandbag the cables, or to rope-off those areas.

## COMMAND POST

G-42. The command post is where the commander and staff perform their activities. The CP is centrally located within the perimeter where it can exercise control over the battery, remain well defended, and have lines of communication with sub-elements. See Appendix B for a more detailed description of a command post.

## SUPPORT ELEMENTS

G-43. The battery support elements are sited to support the tactical elements. Criteria include staying out of the primary and secondary radar sectors, ability to provide effective support, good access routes, and use of area cover and concealment to enhance camouflage efforts.

- **Maintenance area.** The selection of the maintenance area depends on its accessibility to entry and exit routes. The area is located within the perimeter near the entrance. The maintenance area should have an entrance and exit within the perimeter. This area will need to be

big enough for the maintenance center, SRPT, LRPT and the GMT, as well as any other vehicles that may need to be worked on.

- **Ammunition storage**. The basic load of ammunition is removed from transporting vehicles as soon as possible. It must be protected by sandbags or earth revetments and sited near the supply tent.
- **Fuel tanker**. The fuel tanker is sited as near as possible to the primary entrance, inside the perimeter so returning vehicles can be topped off.
- **Troop area.** Personnel are permitted to sleep only in designated areas. Vehicles are not permitted to move without ground guides in areas where troops are sleeping.
- **Mess facilities.** Special attention is given to the selection of the mess area. It should be centrally located within the perimeter, away from interior roads to avoid contamination of the food by dust. The mess area should be at least 100 yards (90 meters) from the latrines. The serving line, or lines, are marked with engineer tape and strategically located to take advantage of available cover and concealment. Serving lines are planned so that a 5-yard (4.5 meter) interval is maintained between personnel under tactical conditions.
- **Latrines.** Latrines are located on the downwind side of the operations area at least 100 yards (90 meters) from the water supply. Latrines should be able to accommodate at least 8 percent of the unit at a time. Hand-washing facilities should be located near the exits.

### PLAN AND PREPARE POSITIONS FOR OCCUPATION

G-44. After the RSOP OIC determines the layout of the new position, he ensures that all ground guides know exactly where they are to go and where equipment is to be placed. Preparations also include marking the location of major sub elements of the unit. Everyone in the RSOP is updated on the challenge and password, changes to the original order or deviations to the SOP, and approximate arrival times of the main body and order of march.

## OCCUPY, ORGANIZE, AND IMPROVE POSITIONS

G-45. The unit is extremely vulnerable during the initial occupation. The main entry control point (ECP) will serve as the dismount point for the arrival of the battery elements. If needed, use roving patrols to augment the light security screen and act as a quick reactionary force. Maintain site security; dig the ECP bunker, design the ECP range card, and run communications wire from the ECP to the battery jump CP. When the main body arrives at the new position, a ground guide meets each major sub-element and leads it to its position. All vehicles are moved off the access road release point and into the position area as quickly as possible, maintaining vehicle intervals for safety.

G-46. Once the main body arrives, the unit focuses all its efforts on rapidly establishing a defensive perimeter, establishing the up range and down range, and reestablishing fire unit operations as quickly as possible. The sooner they get back to their SOR/SOE the sooner they are able to fight. This is being done while maintaining communications to higher headquarters and

also establishing internal communications between the CP and the ECS and also all other platoons. Work priorities are then established and unit personnel are given specific tasks to accomplish. Figure G-2 represents the list of supplies and duties needed to accomplish the RSOP mission.

## RSOP CHECKLIST

### PART I (PREPARATION STAGE):

___ 1. OIC receives briefing and then brief RSOP team within 5 minutes of receipt. After the briefing is given, the RSOP team has 30 minutes to gather necessary personnel and equipment and get off site. The following is information that the OIC should brief to his team.

___ a. Mission/PTL.
___ b. Enemy and friendly situation.
___ c. NBC intelligence.
___ d. Challenge/password.
___ e. Radio frequencies/call signs.
___ f. Current ADW.
___ g. Current state or stage of alert.
___ h. Primary, alternate supplemental locations and routes with maps.
___ i. Terrain and environment.
___ j. Action to take if attacked.
___ k. Movement times.
___ l. Strip maps.
___ m. Convoy procedures.
___ n. Risk assessment.

___ 2. OIC and the BC perform map reconnaissance noting —

___ a. Start point/release point.

___ b. Location of friendly units.
___ c. Potential ambush sites.
___ d. Check points.
___ e. Primary and alternate site locations.
___ f. Primary and alternate routes to the new site.

___ 3 NCOIC ensures the following personnel are available for the RSOP party.

___ a. OIC and NCOIC.
___ b. Driver/ RTO.
___ c. Security team.
___ d. Equipment guide, minesweeping, NBC team, reaction team.
___ e. Communications personnel.
___ f. Launcher personnel.

___ 4. OIC/NCOIC ensures all essential equipment is loaded per load plan to include the following (at a minimum)—

___ a. Supply of rations and water dependent on METT.
___ b. Chemical alarm.
___ c. NBC marking kit.
___ d. Chemical agent detector kit and power supply.
___ e. Mine detecting kit, and batteries.
___ f. Radiac meters.
___ g. Telephone sets, and WD1 communications wire.
___ h. Communications antenna and all sub components for FM commo.

**Figure G-2. RSOP Checklist**

___ i. Measuring tape or a marked engineer tape or rope.
___ j. Equipment marking stakes.
___ k. Map of area.
___ l. Camouflage screen systems.
___ m. Individual weapons and ammunition.
___ n. Protective equipment and LBE.
___ o. Automatic weapons.
___ p. Night sites for selected individual weapons.
___ q. Ground rods.
___ r. Sledgehammer.
___ s. Aiming circle.
___ t. Binoculars.
___ u. Grenade launcher and ammunition.
___ v. Coding equipment.
___ w. Chemical lights.
___ x. Individual flashlights.

___ 5. OIC briefs RSOP party on —
___ a. All items covered in the commander's briefing.
___ b. Convoy speeds.
___ c. Catch up speeds.
___ d. Air guards.
___ e. Procedures in case of attacks, roadblocks, or breakdown.
___ f. Risk Assessment

___ 6. OIC ensures:
___ a. All drivers have strip maps.
___ b. All soldiers have individual weapons, LBE and MOPP gear.
___ c. Chemical alarms are operational and *ON*.
___ d. All vehicle loads are secure.
___ e. RTO performs radio check with Bn/Btry.

**PART II (Movement Stage):**

___ 1. OIC performs route reconnaissance to determine if the route is acceptable, considering—
___ a. Overhead clearance.
___ b. Route security.
___ c. Traffic ability.
___ d. Road width.
___ e. Bridge weight classification.
___ f. Fording sites (amount of water a vehicle can drive through safely).
___ g. Areas for convoy dispersion.
___ h. Landmarks.
___ i. Location for road guides.
___ j. Hazard areas (mines, enemy, NBC).

___ 2. OIC directs specialty teams to secure new position using the following procedures.
___ a. NBC team checks areas with radiac meter, detector paper, and chemical agent kit.

**Figure G-2. RSOP Checklist con't**

___ b. Mine detection team conducts a broad zigzag sweep of site. Operators do not carry weapons. Security guard stays at least 15 meters behind sweeper.
___ c. NBC team and automatic weapon remain behind the mine sweep team.
___ d. Remainder of party form into two fire teams. The teams use bounding over watch, and sweep abreast behind the mine detectors covering the entire area to be occupied. The fire team members remain at least 15 meters.
___ e. OIC establishes rear, flank and forward LP or OP.
___ f. NBC team continually examines area for contamination, and positions alarm unit at the CP and the detector upwind.
___ g. OIC positions a machine gun to cover the site entry road.
___ h. OIC establishes a perimeter defense with rifleman positions or roving guards.
*NOTE: NBC and mine sweeps are done if tactical situation warrants.*

**PART III (Survey Stage):**

___ 1. OIC conducts a site survey/terrain analysis to ensure position acceptability (alternate location)—

___ a. Meets equipment requirements.
- Size of area (1km$^2$).
- Slope of area less than 10 degrees.
- Radar field of view along PTL (reduce radar clutter).
- Clear field of fire.
- Surface firmness (weather dependent).

___ b. Cover and Concealment.
___ c. Immediate access.

___ 2. RSOP OIC lays out new position with support from PADS team if needed. Designates areas for—

___ a. System equipment (marked with survey markings for radar and launchers only).
___ b. Administration
___ c. Vehicle parking.
___ d. Mess.
___ e. Bivouac.
___ f. Fuel truck and HAZMAT.
___ g. ECP bunker.
___ h. Latrine location.

___ 3. OIC ensures the equipment is laid out as follows:

___ a. Orients equipment to give maximum protection in the direction of the avenue of approach.
___ b. Emplaces equipment at the maximum cable length allowed by the site configuration.
___ c. Records ISLB data for radar set.
___ d. Determines PTL and known reference points.
___ e. Determines that line of sight exists for alignment.

**Figure G-2. RSOP Checklist con't**

___ f. Ensures the ECS door faces away from the radar.
___ g. Positions generators to minimize interference.
___ h. Establishes the CP location to ensure it is close to the ECS.
___ i. Positions equipment cables so they are not in a position to be ran over.
___ j. Marks all grounding rods with engineer tape to prevent being hit by vehicles.

___ 4. OIC conducts a rehearsal for ground guides for day and night, and for entry into site with their designated pieces of equipment.

___ a. Ground guides proceed to dismount point of arrival of the equipment.
___ b. OIC makes sure ground guides have colored lens flashlights or chemical lights to use during the hours of darkness (chemical lights may be used to mark equipment locations).

**PART IV (Emplacement Stage):**

___ 1. OIC ensures receipt of main body into the position so that no vehicle is required to stop along the access route.
___ 2. Priorities for site occupation are to prepare the Patriot system to fire/establish CP/BTOC/AMDPCS (as applicable), and establish air defense command and control.
___ 3. OIC maintains communication with a battery/battalion or brigade element (as appropriate).

**Figure G-2. RSOP Checklist con't**

# Glossary

## A

| | |
|---|---|
| **A/L** | administration/logistics |
| **$A^2C^2$** | Army airspace command and control |
| **AA** | avenue of approach |
| **AAA** | air avenue of approach |
| **AADC** | area air defense commander |
| **AAMDC** | Army air and missile defense command |
| **ABMOC** | air battle management operations center |
| **ACA** | airspace control authority; The commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area. (JP 1-02) |
| **ACO** | airspace control order; An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It is published either as part of the air tasking order or as a separate document. (JP 1-02) |
| **ACP** | airspace control plan; The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force area of responsibility/joint operations area. (JP 1-02) |
| **active air defense** | Direct defensive action taken to destroy, nullify, or reduce the effectiveness hostile air and missile threats against friendly forces and assets. It includes the use of aircraft, air defense weapons, electronic warfare, and other available weapons. (JP 1-02) |
| **active defense** | The employment of limited offensive action and counter attacks to deny a contested area or position to the enemy.(JP 1-02) |
| **ACUS** | area common user system |
| **AD** | air defense; All defensive measures designed to destroy attacking enemy aircraft or missiles in the earth's envelope of atmosphere or to nullify or reduce the effectiveness of such attack. (JP 1-02) |
| **ADA** | air defense artillery |
| **ADC** | area damage control |
| **ADRG** | ARC/Army Digitized Raster Graphics |
| **ADW** | air defense warning |

| | |
|---|---|
| **AI** | area of interest; area of concern to the commander. |
| **AIS** | automated information system |
| **AMD** | air and missile defense; As normally used, the term is synonymous with theater air and missile defense. However, the term can also be used in a broader context to apply to any integrated joint force operations conducted to destroy air and missile threats in flight or prior to launch regardless of whether the operations occur in an established theater. The term can also be used in a narrower context to apply to ADA operations (or active defense operations) conducted to destroy air and missile threats in flight (USAADASCH). |
| **AMDCOORD** | air and missile defense coordinator |
| **AMDPCS** | air and missile defense planning and control system |
| **AMDTF** | air and missile defense task force |
| **AMDWS** | air and missile defense work station |
| **AMG** | antenna mast group |
| **AO** | area of operation; |
| **AOC** | air operations center |
| **AOP** | air operations plan |
| **AOR** | area of responsibility |
| **APOD** | air port of debarkation |
| **APOE** | air port of embarkation |
| **ARFOR** | Army forces |
| **ARM** | anti-radiation missile |
| **ARTEP** | Army training evaluation plan |
| **ASAS** | all source analysis system |
| **ASCC** | Army service component commander |
| **ASG** | area support group |
| **ASL** | authorized stockage list |
| **ASM** | air-to-surface missile |
| **ASP** | ammunition supply point |
| **ATDL1** | Army tactical data link 1 |
| **ATM** | anti-tactical missile |
| **ATMCT** | air terminal movement control teams |
| **ATO** | air tasking order; A method used to task and disseminate to components, subordinate units, and command and control agencies those projected sorties/capabilities/forces to targets and specific missions. Normally provides specific instructions to |

include call signs, targets, controlling agencies, etc., as well as general instructions. (JP 1-02)

**ATP** ammunition transfer point

**AUEL** automated unit equipment list

**AWACS** airborne warning and control system

**AZ** azimuth

## B

**BAI** battlefield air interdiction

**battle space** The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes air, land, sea, space, and the facilities of the enemy and friendly forces. (for example weather, terrain, the electromagnetic spectrum, and the information environment within the operational areas and areas of interest). (JP 1-02)

**BCP** battery command post

**BDA** battle damage assessment

**BDE** brigade

**BLOS** beyond line-of-sight

**BM** ballistic missile

**BME** battalion maintenance equipment

**BMG** battery maintenance group

**BMNT** begin morning nautical twilight

**BMO** battalion maintenance officer

**BN** battalion

**BOS** base operating support

**BSA** brigade support area

**BSE** battalion supply and equipment

**BTRY** battery

## C

**C / E** communications / electronics

**$C^2$** command and control

**$C^3$** command, control, and communications

**$C^3I$** command, control, communications and intelligence

| | |
|---|---|
| **C4I** | command, control, communications, computers, and intelligence |
| **CAL** | critical asset list |
| **CAS** | close air support |
| **CCIR** | commander's critical information requirement |
| **CDR** | commander |
| **CE2** | communication enhancement 2 |
| **CE** | communications electronics |
| **CEB** | clothing exchange and bath |
| **CEP** | circular error probability |
| **CESO** | communications / electronics signal officer |
| **CFL** | coordinated fire line |
| **CG** | commanding general |
| **CINC** | commander in chief |
| **CJTF** | commander joint task force |
| **CM** | cruise missile |
| **CMCC** | corps movement control center |
| **CMCT** | corps movement control teams |
| **CMMC** | corps materiel management center |
| **COA** | course of action |
| **COFA** | correlation of forces-air |
| **COMMO** | communication |
| **COMMZ** | communication zone |
| **COMSEC** | communications security |
| **CONUS** | continental United States |
| **COORD** | coordination |
| **COSCOM** | corps support command |
| **CP** | command post |
| **CPP** | communications patch panel |
| **CPU** | central processor unit |
| **CRC** | control and reporting center |
| **CRE** | control and reporting element |
| **CRG** | communications relay group |
| **CS** | combat support |

| | |
|---|---|
| **CSA** | corps storage area |
| **CSB** | corps support battalion |
| **CSC** | combat support company |
| **CSG** | corps support group |
| **CSR** | controlled supply rate |
| **CSS** | combat service support |
| **CTT/H-R** | Commander's Tactical Terminal/ Hybrid Receiver |
| **CVRT** | criticality, vulnerability, recuperability, and threat |

## D

| | |
|---|---|
| **DA** | Department of Army |
| **DAADC** | deputy area air defense commander |
| **DAL** | defended asset list; A ranked listing of facilities, forces, and national political items that require protection from attack or hostile surveillance. The list is compiled from federal departments and agencies, unified and specified commands, and the armed services to ensure national security emergency preparedness functions. |
| **DCA** | defensive counterair; All defensive measures designed to detect, identify, intercept and destroy or negate enemy forces attempting to attack or penetrate the friendly air environment. (JP 1-02) |
| **DCG** | deputy commanding general |
| **DCN** | data coordination net |
| **DEL** | deployment equipment list |
| **DISCOM** | division support commands |
| **DLT** | data link terminal; Sends/receives LS data via VHF radio and fiber optic link. |
| **DLU** | digital link upgrade |
| **DNLP** | deployed net loading percentage |
| **DP** | decision point |
| **DS** | direct support |
| **DSA** | division support area |
| **DNVT** | digital nonsecure voice terminal |
| **DSM** | decision support matrix |
| **DSS** | direct supply support |

| | |
|---|---|
| **DST** | decision support template |
| **DSU** | direct support unit |
| **DTED** | digital terrain elevation data |
| **DX** | direct exchange |
| **DZ** | drop zone |

## E

| | |
|---|---|
| **EAC** | echelon above corps; Army headquarters and organizations that provide the interface between the theater commander (joint or multinational) and the corps for operational matters. |
| **ECCM** | electronic counter-countermeasure |
| **ECM** | electronic countermeasure |
| **ECN** | engagement coordination net |
| **ECP** | entry control point |
| **ECS** | engagement control station |
| **ECU** | environmental control unit |
| **EDWA** | engagement decision and weapons assignment |
| **EEFI** | essential elements of friendly information |
| **EENT** | end evening nautical twilight |
| **ELES** | enhanced launcher electronics system |
| **EMCON** | emission control; The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for security: a. detection by enemy sensors; b. minimize mutual interference among friendly systems; c. execute a military deception plan. (JP 1-02) |
| **EMI** | electromagnetic interference |
| **EMMO** | electronic missile maintenance officer |
| **EMP** | electromagnetic pulse; The electromagnetic radiation from a nuclear explosion caused by compton recoil electrons and photoelectrons scattered in the material of the nuclear device or in a surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. (JP 1-02) |
| **EOB** | enemy order of battle |
| **EPLRS** | enhanced positioning location reporting system |
| **EPP** | electric power plant |
| **EPU** | electric power unit |

**EPW** enemy prisoner of war

**EW** electronic warfare; Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. The three major divisions within electronic warfare are electronic attack, electronic protection, and electronic warfare support. (JP 1-02)

## F

**FAA** forward assembly areas

**FAAD** forward area air defense

**FB** firing battery

**FCO** fire control orders; Commands, which are used to control engagements on a case-by-case basis, regardless of the prevailing weapon, control status. Higher control echelons when monitoring the decentralized operations of subordinate units most often use these commands. Fire control orders can be transmitted electronically or verbally; however not all of the fire control orders shown below can or will be used by every type of ADA unit. (JP 1-02)

**FDC** fire direction center; That element of a command post, consisting of gunnery and communications personnel and equipment, by means of which the commander exercises fire direction and/or fire control. The fire direction center receives target intelligence and requests for fire, and translates them into appropriate fire direction. (JP 1-02)

**FEBA** forward edge battle area

**FFIR** friendly forces information requirements

**FLOT** forward line of own troops

**FM** frequency modulation; field manual

**FO** fiber optic

**FOB** forward operating base

**FO-DTG** fiber optic-day time group

**FORSCOM** United States Army Forces Command

**FOV** field of view

**FSB** forward support battalion

**FSCL** fire support coordination line

**FSCM** fire support coordination measure

**FSCOORD** fire support coordinator

**FSE** fire support element

**FSOP** field standing operating procedure

**FU** fire unit

**FUFU** fire unit to fire unit; The fire unit to fire unit capability within the Patriot system allows fire units to conduct a coordinated air battle without an ICC. In FUFU mode of operations, fire units perform triangulation, track correlation, engagement coordination, and support. The ICC track management software has been implemented at the fire units, so that those functions are now available at the fire unit. The weapons control state on each track is also shared with all fire units. Each fire unit performs triangulation using shared data from at least two other FUs. This provides range data on these tracks to the other units.

**FW** fixed wing

## G

**GCFU** ground communications filter unit

**GEHOC** German Hawk operations center

**GEM** guidance-enhanced missile

**GIP** ground impact point

**GM** guided missile

**GMT** guided missile transport

**GPFU** gas particulate filter unit

**GPS** global positioning system; A satellite based system used for accurate positioning and navigation.

**GS** general support

## H

**HACM** high altitude cruise missile

**HCU** hard copy unit

**HE** high explosive

**HEMTT** heavy expanded mobility tactical truck

**HEU** higher echelon unit

**HF** high frequency

**HHB** headquarters and headquarters battery

**HMMWV** high mobility multipurpose wheeled vehicle

**HPT** high-payoff target; A target whose loss to the enemy will significantly contribute to the success of a friendly course of action. High-payoff targets are those high-value targets,

identified through war gaming, which must be acquired and successfully attacked for the success of the friendly commander's mission. (JP 1-02)

**HQ** headquarters

**HSS** health service support

**HVT** high-value target; A target the enemy commander requires for the successful completion of the mission. The loss of high-value targets would be expected to seriously degrade important enemy functions throughout the friendly commander's area of interest. (JP 1-02)

## I

**IAW** In accordance with

**ICC** information and coordination central

**ICE** initial coordination element

**ID** identification

**IDOCS** integrated digital operator control station

**IEW** intelligence and electronic warfare

**IF** intermediate frequency

**IFF** identification, friend or foe; A system using electromagnetic transmissions to which equipment carried by friendly forces automatically responds; for example, by emitting pulses, thereby distinguishing themselves from enemy forces. (JP 1-02)

**IPB** intelligence preparation of the battlespace

**IR** information requirement

**ISA** international standardization agreement

**ISE** intelligence support element

**ISLB** initial search lower bounds

**ISR** intelligence, surveillance, reconnaissance

## J

**JAOC** joint air operations center

**JDN** joint data net

**JECN** joint engagement coordination net

**JFACC** Joint Force Air Component Commander; The joint force air component commander derives authority from the joint force commander who has the authority to exercise operational control, assign missions, direct coordination among subordinate commanders, redirect and organize forces to ensure unity of

effort in the accomplishment of the overall mission. Using the joint force commander's guidance and authority, and in coordination with other service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas. (JP 1-02/ (FM 6-99.1))

**JFC** Joint Force Commander; A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. (JP 1-02/ (FM 6-99.1))

**JFLCC** Joint Force Land Component Commander; The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of land forces, planning and coordinating land operations, or accomplishing such operational missions as may be assigned. The joint force land component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. The joint force land component commander will normally be the commander with the preponderance of land forces and the requisite command and control capabilities. (JP 1-02)

**JFMCC** Joint Force Maritime Component Commander; The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of maritime forces and assets, planning and coordinating maritime operations, or accomplishing such operational missions as may be assigned. The joint force maritime component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. The joint force maritime component commander will normally be the commander with the preponderance of maritime forces and the requisite command and control capabilities. (JP 1-02/ (FM 699.1))

**JFSOCC** Joint Forces Special Operations Component Commander

**JICO** Joint Interface Control Officer; The joint interface control officer (JICO) coordinates with the ARFOR or JFLCC, coordination is essential to the successful integration of ADA forces into theater counter air and TMD. The JICO is responsible for managing the multi data link network from the AOC. The JICO cell supports continuous operations. Each service normally contributes personnel or expertise to the JICO cell to plan and execute joint operations. The AAMDC normally would provide the ARFOR or JFLCC expertise to the JICO cell to ensure integration of

ARFOR air and missile defense operations with joint or multinational operations.

**JIPTL** joint integrated prioritized target list; A prioritized list of targets and associated data approved by a joint force commander, and maintained by a joint task force. Targets and priorities are derived from the recommendations of components in conjunction with their proposed operations supporting the joint force commander's objectives and guidance. (JP 1-02)

**JLENS** joint land attack cruise missile elevated netted sensor system

**JMMN** joint mission management net

**JOA** joint operations area; An area of land, sea, and airspace, defined by a geographic combatant commander or subordinate unified commander, in which a joint force commander (normally a joint task force commander) conducts military operations to accomplish a specific mission. Joint operations areas are particularly useful when operations are limited in scope and geographic area or when operations are to be conducted on the boundaries between theaters. (JP 1-02)

**JSN** joint surveillance net

**JTAMD** joint theater air and missile defense; JTAMD includes all measures and means designed to nullify or reduce the effectiveness of surveillance and attacks against the joint force by air and missile threats. Air defense operations represent the Army's contribution to JTAMD operations. JTAMD is conducted to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy air and missile forces. JTAMD operations include such measures as the use of interceptors, bombers, antiaircraft guns, surface to surface and surface to air missiles, air to surface missiles, elements of information operations, and electronic countermeasures to destroy the air or missile threat both before and after it is launched.

**JTIDS** joint tactical information distribution system; A joint service, jam-resistant, secure communications system that permits the interchange of essential tactical information between aircraft, surface vessels, and mobile or fixed-base land stations.

**JTMD** joint theater missile defense; The integration of joint force capabilities to destroy enemy theater missiles in flight or prior to launch or to otherwise disrupt the enemy's theater missile operations through an appropriate mix of mutually supportive passive missile defense; active missile defense; attack operations; and supporting command, control communications, computers, and intelligence measures. Enemy theater missiles are those that are aimed at targets outside the continental United States. (JP 1-02)

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| **JTT-T/R** | joint tactical terminal-transmit/receive |

## K

| | |
|---|---|
| **KBPS** | kilobits per second |
| **KIA** | killed in action |
| **KM** | kilometer |
| **KRP** | known reference point |
| **KW** | kilowatts |

## L

| | |
|---|---|
| **LAN** | local area network |
| **LAT** | live air trainer |
| **LC** | line of contact |
| **LCC** | land component commander |
| **LCE** | lightweight computer equipment |
| **LCM-8** | launcher control module -8 |
| **LCS** | launcher control station |
| **LD** | line of departure |
| **LEM** | launcher electronics module |
| **LLCOA** | least likely course of action |
| **LMRD** | launcher missile round distributor |
| **LNIP** | launch now intercept point |
| **LNO** | liaison officer |
| **LOC** | line of communications; All routes, land, water, and air, which connects an operating military force with a base of operations and along which supplies and military forces move. (JP 1-02/ (FM 6-99.1)) |
| **LOG** | logistics |
| **LOGPAC** | logistics package |
| **LOP** | level of protection |
| **LOS** | line-of-sight |
| **LOTS** | logistics over the shore |
| **LRP** | logistics release point |
| **LRPT** | large repair parts transporter |
| **LS** | launching station |

| | |
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| **LSDU** | launcher station diagnostic unit |
| **LSTS** | launching station test set |
| **LTDA** | lower-tier defended area |
| **LZ** | landing zone |

## M

| | |
|---|---|
| **M** | meter |
| **MANPADS** | man portable air defense system; The Stinger MANPADS team carries a man portable, shoulder fired, infrared or IR/NUV seeking missile that requires no control from the gunner after firing. It has an identification, friend or foe (IFF) interrogator that aids the gunner and team chief in identifying targets. The team consists of a gunner and team chief. (FM 3-01.11) |
| **MATO** | Materiel officer |
| **MBA** | main battle area |
| **MC** | maintenance center; maintenance company |
| **MCA** | movement control agency |
| **MCO** | movement control officer |
| **MCOO** | modified combined obstacle overlay |
| **MCP** | maintenance collection point |
| **MCPE** | modular collective protective equipment |
| **MCR** | movement completion report |
| **MCT** | movement control team |
| **MDCOA** | most dangerous course of action |
| **MDMP** | military decision making process |
| **MEDLOG** | medical logistics |
| **MEL** | mobile erector launcher |
| **MEP** | minimum engagement package |
| **METL** | mission-essential task list; A compilation of collective mission-essential tasks, which must be successfully performed if an organization is to accomplish its wartime mission(s). |
| **METT-TC** | mission, enemy, terrain and weather, troops, time available, and civil considerations |
| **MEZ** | missile engagement zone |
| **MI** | military intelligence |
| **MLCOA** | most likely course of action |

| | |
|---|---|
| **MILVAN** | military van |
| **MMC** | Materiel Management Center |
| **MOB** | mobilization |
| **MOBEX** | mobilization exercise |
| **MOPP** | mission oriented protective posture |
| **MOS** | military occupational specialty |
| **MPL** | mandatory parts list |
| **MRBM** | medium range ballistic missile |
| **MRT** | missile round transporter |
| **MS** | mobilization station |
| **MSB** | main support battalion |
| **MSE** | mobile subscriber equipment |
| **MSE SEN** | mobile subscriber equipment small extension node |
| **MSR** | main supply route |
| **MST** | maintenance support team |
| **MSU** | mass storage unit |
| **MTOE** | modified table of organization and equipment |
| **MWO** | movement warning order |

## N

| | |
|---|---|
| **NAI** | named area of interest; The geographical area where information that will satisfy a specific information requirement can be collected. Named areas of interest are usually selected to capture indications of adversary courses of action, but also may be related to conditions of the battlespace. (JP 1-02) |
| **NATO** | North Atlantic Treaty Organization |
| **NBC** | nuclear, biological and chemical |
| **NCO** | noncommissioned officer |
| **NCOER** | non-commissioned officer efficiency report |
| **NCS** | net control station; Communications stations designated to control traffic and enforce circuit discipline within a given net. (JP 1-02) |
| **NFS** | North finding system |
| **NPG** | network participation groups |
| **NSL** | non-stocked logistics |

## O

**O & I** operations and intelligence

**OCA** offensive counterair; Offensive operations to destroy, disrupt, or neutralize enemy aircraft, missiles, launch platforms and supporting structures and systems both before and after launch, but as close to their source as possible. Offensive counterair operations range throughput enemy territory and are generally conducted at the initiative of friendly forces. These operations include attack operations, fighter sweeps, escort, and suppression of enemy air defenses. (JP 1-02)

**OCOKA** observation and field of fire, cover and concealment, obstacles

**OCONUS** outside the continental United States

**ODD** optical disk drive

**OER** officer evaluation report

**OIC** officer in charge

**OP** observation post

**OPCON** operational control

**OPLAN** operation plan

**OPORD** operation order

**OPSEC** operational security

**OPTASKS** operational tasks

**ORF** operational readiness float

**ORL** ordnance release line

## P

**P&A** personnel and administration

**PAC-3** Patriot advanced capability-3

**PADIL** Patriot digital information link

**PADS** position and alignment determining system

**PAO** public affairs office

**PD** passive defense; Applies to measures initiated to reduce vulnerability and to minimize damage caused by theater missiles TM attacks. Passive defense includes TM counter proliferation and deterrence; TM early warning and nuclear, biological, and chemical protection; counter surveillance; deception; camouflage and concealment; hardening; electronic warfare; mobility; dispersal; redundancy; recovery, and reconstitution. (FM 6-99.1)

**PDB** post deployment build

**PDU** power distribution unit

**PE** priority of engagement

**PFU** Patriot fire unit

**PGIP/T** predicted ground impact point/time

**PIR** priority intelligence requirement

**PK** probability of kill

**PLL** prescribed load list

**PMCS** preventative maintenance checks and services

**POD** port of debarkation

**POE** port of embarkation

**POL** petroleum, oils and lubricants

**POM** preparation for overseas movement

**POR** proposed operational requirement

**positive control** A method of airspace control that relies on positive identification, tracking and direction of aircraft within an airspace, conducted with electronic means by an agency having the responsibility and authority therein. (JP 1-02)

**PP** priority of protection

**PPI** Passé-Partout International

**PPLI** precise participant location information

**PPO** Patriot project office

**PPP** power projection platform

**procedural control** A method of airspace control that relies on a combination of previously agreed and promulgated orders and procedures. (JP 1-02)

**PSP** power support platform

**PTL** primary target line; PTLs are established to assist in the distribution of ADA fires. Sectors of fire for HIMAD are normally designated at battalion after review of radar coverage diagrams. The battery commander or platoon leader normally designates sectors of fire or PTLs for SHORAD. These limits must be clearly defined by right and left azimuths. (FM 3-01)

## Q

**QA** quality assurance; That function of management by which conformance of material to contract and specification requirements is assured. This assurance is obtained by

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| | evaluation of production quality controls and inspections exercised by procedures, supplemented by direct verification inspection of product. (AR 310-25) |
| **QRP** | quick response program |

## R

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|---|---|
| **R/T** | receiver/transmitter |
| **RAA** | redeployment assembly area |
| **RACO** | rear area combat operations |
| **RADC** | regional air defense commander |
| **RAP** | rear area protection |
| **RC** | reserve component |
| **RCS** | radar cross section; Area of an object as scanned by radar; measured in square meters. |
| **RF** | radio frequency |
| **RFI** | radio frequency interference |
| **RL** | remote launch |
| **RLCEU** | remote launch and communications enhancement upgrade |
| **RLRIU** | routing logic radio interface unit; Provides interface between WCC, modems, and UHF radios. |
| **RMCT** | regional movement control team |
| **RO/RO** | roll on/roll off |
| **ROE** | rules of engagement; Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. (JP 1-02) |
| **ROZ** | restricted operating zone |
| **RP** | release point |
| **RRT** | radio relay terminal |
| **RS** | radar set |
| **RSOP** | reconnaissance, selection and occupation of position |
| **RSR** | required supply rate |
| **RSTA** | reconnaissance, surveillance and target acquisition |
| **RSU** | recovering storage unit |
| **RW** | rotary wing |
| **RWCIU** | radar weapons control interface unit |

**RX** repairable exchange

## S

**S1** personnel officer

**S2** intelligence officer

**S3** operations and training officer

**S4** supply officer

**SA** situational awareness

**SAM** surface-to-air missile

**SATCOM** satellite communications

**SHORAD** short-range air defense

**SIF** selective identification feature

**SIGINT** signals intelligence

**SIGO** signal officer

**SIGSEC** signal security

**SINCGARS** single-channel ground and airborne radio system

**SIT TEMP** situation template

**SMU** switch multiplexer unit

**SOEC** state of emission control

**SOF** special operations forces

**SOI** signal operating instructions

**SOJ** stand-off jammer

**SOJC** Patriot missile standoff jammer counter "SOJC" MIM-104B; To counter the long-range ECM threat, use the MIM-104B or SOJC missile. The guidance and navigation hardware was modified to allow the SOJC missile to fly a lofted trajectory to the jamming source and seek out the strongest emitter during terminal phase. To achieve the lofted trajectory needed to maintain missile maneuverability at long range, missile acquisition is delayed for the SOJC mission. The SOJC can fly five times longer than the standard missile without the uplink/downlink between the radar and missile. The SOJC missile retains the same performance against ABTs and TBMs as the standard missile. (FM 3-01.87)

**SOP** standing operating procedures; A set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The procedure is applicable unless ordered otherwise. (JP 1-02)

**SP** start point

**SPOD** seaport of debarkation

**SPOE** seaport of embarkation

**SRBM** short range ballistic missile

**SRP** sealift readiness program

**SRPT** small repair parts transporter

**SSC** small scale operations

**SSEKP** single shot engagement kill probability

**SSM** surface to surface missile

**STL** secondary target line

## T

**TAA** tactical assembly area

**TAACOM** Theater Army Area Command

**TAADCOM** Theater Army Area Defense Command

**TAAMDCOORD** Theater Army Air and Missile Defense Coordinator

**TAC** tactical

**TACC** tactical air command center

**TACI** tactical initialization

**TACON** tactical control; Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of combatant command. (JP 1-02)

**TACS** theater air control system

**TACSAT** tactical satellite

**TADIL** tactical digital information link; A Joint Staff approved, standardized communication link suitable for transmission of digital information. Current practice is to characterize a tactical digital information link (TADIL) by its standardized message formats and transmission characteristics. TADILs interface two or more command and control or weapons systems via a single or multiple network architecture and multiple communication media for exchange of tactical information. a. TADIL-A–A secure, half-duplex, netted digital data link utilizing parallel transmission frame characteristics and standard message formats at either 1364 or 2250 bits per second. b. TADIL-B−A secure, full-duplex, point-to-point digital data link utilizing

serial transmission frame characteristics and standard message formats at 2400, 1200, or 600 bits per second. It interconnects tactical air defense and air control units. c. TADIL-C–An unsecure, time-division digital data link utilizing serial transmission characteristics and standard message formats at 5000 bits per second from a controlling unit to controlled aircraft. Information exchange can be one-way (controlling unit to controlled aircraft) or two-way. d. TADIL-J–A secure, high capacity, jam-resistant, nodeless data link which uses the Joint Tactical Information Distribution System (JTIDS) transmission characteristics and the protocols, conventions, and fixed-length message formats defined by the JTIDS Technical Interface Design Plan (TIDP). (JP 1-02)

**TAI** target area of interest

**TAMCA** Theater Army Movement Control Agency

**TAOC** tactical air operations center

**TASM** tactical air-to-surface missile; TASMS are air-launched, precision-guided munitions designed to strike ground targets. They are ideal against targets, such as bridges, that are difficult to destroy with “dumb” bombs. They are similar to air-launched CMs, but are smaller, have shorter ranges, lack wings and aerodynamic lift associated with CM flights, and are launched by tactical fighter-bomber aircraft.

**TBM** theater ballistic missile

**TCO** tactical control officer

**TCS** tactical command system; The Patriot tactical command system is a facility which accommodates the commander and staff of up to ten air defense personnel and provides automated equipment to support force operations (FO) tasks which complement the EO activities in the Patriot ICC. The TCS is mounted on an M934 5-ton expandable van. It is co-located with and interfaces directly to the Patriot ICC using MSE and LAN, uses US Army common hardware and software components, and is powered by a standard US Army 30 kw, 60 hz generator with UPS backup power. (FM 3-01.11)

**TD** tactical director

**TDA** tactical director assistant

**TEL** transporter erector launcher; A self-propelled launch vehicle capable of transporting a TBM to a tactical location and elevating and launching the missile. A TEL contains all ancillary equipment needed to support launch operations.

**TF** task force

**TFL** time to first launch; TFL is an estimated time it takes for the target approaching the battery to be engaged with intercept occurring within an acceptable probability of kill. The acceptable

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|---|---|
| | kill probability region is within the azimuth limits of the track sector and within a range value based on the target's altitude and ECM history. (FM 301.87) |
| **THAAD** | theater high altitude area defense; The THAAD system is being designed to negate TBMs at long ranges and high altitudes, supporting both exoatmospheric and endoatmospheric hit-to-kill engagements. |
| **theater air and missile defense** | The integration of joint force capabilities to destroy air or theater missile threats in flight or prior to launch or to otherwise disrupt the enemy's air and theater missile operations through an appropriate mix of offensive counterair (OCA) and defensive counterair (DCA) operations consisting of mutually supportive passive air defense; active air defense; attack operations; and supporting command, control, communications, computers and intelligence ($C^4I$) measures. |
| **TIBS** | tactical information broadcast service |
| **TLL** | time to last launch; TLL is the time remaining to the last opportunity to initiate an engagement so intercept will occur before the target penetrates the asset boundary. (FM 3-01.87) |
| **TM** | theater missile; A missile, which may be a ballistic missile, a cruise missile, or an air-to-surface missile (not including short-range, nonnuclear, direct fire missiles, bombs, or rockets such as Maverick or wire-guided missiles), whose target is within a given theater of operation. (JP 1-02) |
| **TMD** | theater missile defense; Theater missile defense applies to the identification, integration, and employment of forces supported by other theater and national capabilities to detect, identify, locate, track, minimize the effects of, and/or destroy enemy TMs on the ground and in flight, their ground-based launchers and supporting infrastructure; TM-capable ships and vessels in port or at sea; and enemy aircraft armed with air-to-surface missiles. (JP 3-01.5) |
| **TMO** | transportation movement officer |
| **TOC** | tactical operations center |
| **TOE** | table of organization and equipment |
| **TPL** | timed phase line |
| **TPW** | tactical planner workstation |
| **TRADOC** | training and doctrine command |
| **TRANSCOM** | transportation command |
| **TRITAC** | tri-service tactical communications |
| **TSA** | theater storage area |
| **TSC** | theater signal command |

**TSOP** tactical standing operating procedure

**TST** time sensitive target

**TTFL** time to first launch

**TTLL** time to last launch

**TTP** tactics, techniques and procedures

**TVA** target value analysis

**TVM** track via missile; The Patriot missile is commanded to the vicinity of the target by the WCC and then the on board missile seeker acquires the target. The target is then TVM, while the two-way data link is maintained at an increased rate. The missile moves to the intercept point while the RS illuminates the target. (FM 3-01.11)

## U

**UAV** unmanned aerial vehicle; A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semiballistic vehicles, cruise missiles, and artillery projectiles are not considered UAVs. (JP 1-02)

**UHF** ultrahigh frequency

**ULLS** unit level logistics system

**UMCP** unit maintenance collection point

**UMO** unit movement officer

**US** United States

**USAADASCH** United States Army Air Defense Artillery School

**USAF** United States Air Force

**USAR** United States Army Reserve

**USAREUR** United States Army European Command

**UTM** universal transverse mercator (grid); unit training mission

## V

**VHF** very high frequency

## W

**WARNO** warning order

**WCC** weapons control computer

**WCS** weapon control status

**WMD** weapons of mass destruction

**WO** warning order; A preliminary notice of an order or action, which is to follow. (JP 1-02)

## X

**XO** executive officer

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# INDEX


## A

AAMDC, 3-1, 3-2, 3-8, C-2, C-3, D-12, D-15
ADA mission, 1-1
ADA role, 1-1
air avenues of approach, 3-13, D-7, D-9
Air Defense Artillery (ADA), 1-1, 3-1
airspace control measures, 3-2, 5-7, 6-2, D-4
airspace control order (ACO), 3-2, C-6
alert states, 5-2
AMD task force, 1-2, 3-13, 4-5, 5-1, 5-11, 5-13, E-5, C-11
  planning, 3-1, 3-5
  safety, E-6
area damage control (ADC), 6-24, C-4
avenues of approach, 3-13, 3-17, 5-5, 5-7, D-9

## B

ballistic missile, 1-1, 2-1, 5-13, 5-17
battalion, 2-1, 3-1, 3-5, 4-8, 5-10, 6-1, A-1, B-1, C-1
  command FM net, C-5
  communications, C-2, C-8, C-16, C-18
  headquarters, A-1, B-13, C-3
  planning, 3-1, 3-5
battalion staff, 3-6, A-1, B-4, D-1, G-1
  chaplain, 6-4, 6-26, A-1, A-2
  electronic missile maintenance officer, 6-5
  medical, 6-1, 6-4, 6-18, A-3
  maintenance officer, 6-5
  S-1, 4-8, 6-3, 6-18, 6-29, A-1
  S-2, 3-8, 3-10, 3-18, 5-9, 6-4, 6-24, 6-30, A-1, A-3, D-1, D-5, D-10
  S-3, 3-8, 3-11,3-14, 3-18, 5-3, 5-10, 5-19, 6-1, 6-14, 6-26, 6-30, A-3, D-17
  S-4, 4-8, 6-1, 6-16, 6-24, 6-30, A-4
  surgeon, 6-4
battery, 3-8,3-11, 3-17, 5-3, 6-1, 6-6, 6-28, A-1, A-4, G-1
  commander, 3-6, 5-20, 6-1, 6-9, 6-22, 6-28, G-2
  communications requirements, C-8, C-10
  elements, 6-6, C-6, G-4, G-11
  executive officer, 5-19, 6-3, 6-11, A-2
  first sergeant, 6-6
  motor sergeant, 6-6
  platoon leaders, 6-6, A-5, G-2
  supply sergeant, 6-7
battlefield visualization, 3-7, D-1
battle space, 2-6, D-1, D-3, D-10, D-14
bounding over watch, 4-6, 5-3
brigade, 3-1, 3-4, 3-7, 6-1, 6-2, 6-24, C-2, C-15

## C

C-5 aircraft data, F-4
C-17 aircraft data, F-5
combat service support (CSS), 1-1, 6-1
combat support company (DS), 6-5, 6-8
command and control, 2-2, 3-11, 3-17, 5-3, 6-10, A-2
  air defense, 5-3, 5-20
  battalion planning, 6-23
  command post, 3-8, 3-17, 5-19, B-6
  fire direction center, 2-3, 5-19, A-1, A-4, B-1
  tactical operations center, 5-19
command, control, communications, and intelligence ($C^3I$), 2-5, 4-5, 5-1, 5-19,
  defensive operations, 5-1, 5-5
communications, 3-12, 5-5, 5-18, 6-11, A-3, Appendix C, G-3
  ABT defense design, 3-18
  battalion communications, C-2, C-16
  combat support company, 6-8
  command post, 2-1, 5-19, 6-4, 6-27, A-4, B-6, G-7, G-10
  FM net, C-4, C-14
  planning, 3-13, A-3, C-1, C-11 C-14, C-20
  security, 6-8
  standardization, C-17
  UHF, 6-11, A-3, B-1, B-5, C-1, D-7
  voice, 2-5, 5-19, A-3, B-5, C-1
  wire, 6-11, A-3, B-2, C-9, C-17, G-9
communications relay group (CRG), 3-13, A-3, B-1, B-11, C-3, C-14, C-16, F-4
  enhanced (CRG)(LCS), 3-17
concept of operations, 3-1, 5-7, 6-9
contingency theater threat, 2-1
convoys, 2-4, 6-24, E-4
corps planning, 3-4
cover and concealment, 6-10, D-6, G-6
  masking, 2-3

critical information requirements (CIR), 3-7, D-5

## D

data communications, C-3, C-20
data communications,
ATDL-1, C-15, C-21
PADIL, C-3, C-15, C-19
TADIL-A, C-2, C-15
TADIL-B, A-4, C-2, C-15, C-22
TADIL-J, 5-16, B-6, C-2, C-11, C-15
data links, 2-3, C-4, C-14
data link considerations, C-20
decision support template (DST), 3-15, D-17
decontamination, 6-24, 6-28, 6-29
defended asset list (DAL), 3-1, 5-7, 6-23
defense design planning, 3-12, 5-15, B-4, G-9
defensive operations, 5-1, 5-5, 5-11, D-10
TBM defense design, 3-13, 5-4, 5-9
deployment, 3-5, 4-3, 4-4, 6-28, B-2, C-19, D-3, F-1, G-7
distribution, 3-7, 5-10, 6-5, 6-11, 6-13
doctrinal, C-2, D-10

## E

Echelon above corps (EAC), 1-2, 3-1, 4-5, 5-1, 5-7, 6-1, 6-14, 6-21, C-1
early warning, 3-14, 5-2, 5-7, 5-16, 6-25, B-6, C-3
electronic power plant (EPP), A-4, B-1, B-10, F-4, F-10
electronic power unit (EPU), F-11
electronic warfare, 2-3, 2-5
emplacement, 5-6, 5-9, 5-13, A-5, B-7, B-11, C-10, C-17, G-1, G-8
employment, 4-1, 4-5, 5-2, 5-6, 5-11, 6-27, D-2, D-11
engagement control station, 3-13, 4-4, 5-11, A-4, , B-1, B-5, B-7, C-10, C-20, F-2, F-6, G-9
engagement effectiveness, 3-2, 3-4, 5-21
engagement operations, 3-18, 5-19, B-1, C-4, C-14
entry operations, 1-2, 2-5, 4-1, 4-5, 5-16
post conflict, 4-5
stability and support operations, 4-5, 4-6, 5-16
essential elements of friendly information (EEFI), 3-7, D-11
equipment considerations, G-8

## F

field services, 4-9, 6-23
fire control, 2-4, 5-13, A-4, C-3, G-3, G-8
fire direction center (FDC), 5-19, A-1, B-1
fire unit (FU), 3-2, 3-12, 3-15, 3-18, 5-16, A-4, B-1, C-22
fire unit to fire unit, C-22
fixed wing aircraft, 2-5, 5-2, 5-8, 5-13, 5-16, D-7, D-9
FM communications, A-2, B-9
force-projection operations, Chapter 4, 6-1
force projection process, 4-1, 4-7
friendly, 1-2, 2-5, 3-7, 3-14, 3-16, 5-19, D-4, D-8, D-10, G-1
friendly forces, 1-2, 2-5, 3-8, 3-14, 5-19, D-4, D-8
friendly force information requirements (FFIR), 3-7,
FU locations, 3-12, 5-9

## G

global positioning system (GPS), 2-1
guidelines, 5-6, 5-10, 5-12, B-12, G-1
guided missile, 2-2, 6-15, A-3, B-1, F-4

## H

hazards, 3-8, E-1, E-2, G-8
highway transportability, 4-4, F-1
weight, B-1, B-14

## I

information coordination central (ICC), 3-13, 3-16, 3-18, 5-13, 5-19, A-3, B-1, C-6, C-17, F-4, F-7, G-9
integrated firing concept, 5-21
intelligence, 1-2, 3-6, 5-2, 5-19, A-3, C-5
intelligence preparation of the battle space (IPB), 3-7, 3-12, 3-17, 5-14, Appendix D

## J

joint data network (JDN), 5-18, 5-19, C-12
joint engagement coordination network (JECN), 5-19, C-11, C-12
JTIDS, C-3, C-11, C-14
JFACC, 3-2, 5-20
joint force planning, 3-1

## L

Large caliber rockets (LCRs), 2-4
launcher, 3-13, 4-4, 5-3, 5-9, 5-12, 6-17, A-5, B-9, E-5, G-9
launcher dead zones, A-5
launcher emplacement, 5-13, C-10
local launcher, 5-5, 5-13, C-10, G-9
remote launcher, 3-13, 4-6, 5-1, 5-13, B-8, C-10, F-4, G-7
launcher control station (LCS), 3-13, 5-14, B-5, C-14, G-9

levels of engagement effectiveness, 3-2, 5-21
lifting and tie down provisions, Appendix F
loading considerations, F-2
locations, 3-10, 3-18, 4-8, 5-3, 6-10, C-16, G-1, G-9
logistics, 2-5, 5-19, 6-1, 6-5, 6-8, 6-10, 6-27, A-2, C-3, C-5
lower tier defended areas (LTDA), 5-14

## M

maintenance, 3-7, 3-9, 3-11, 3-17, 4-7, 6-1, 6-5, 6-8, 6-20, A-3,
C-6, E-5, G-10
battle damage assessment, 2-3, 6-22
cannibalization, 6-6, 6-21, 6-22
center, B-3, B-13, C-3
controlled exchange, 6-22
DS/GS, 6-1, 6-5, 6-8, 6-19, 6-20, B-3
operator, 6-20
recovery and evacuation, 6-5, 6-21
major end items, 4-7, 6-5, 6-18, B-1
antenna mast group (AMG), A-4, B-1, B-11, C-15, F-9, G-19
communications relay group (CRG), 3-13, A-3, B-1, B-11, C-3, C-14, F-7, G-9
electronic power plant (EPP), A-4, B-3, B-10, F-10, G-9
engagement control station (ECS), 3-17, 5-11, A-4, B-1, B-5, C-10, C-20, F-2, F-6, G-9
information coordination central (ICC), 3-13, 3-16, 3-18, 5-19, B-1, C-5, C-14, C-20, F-7
launching station (LS), 5-13, 6-17, A-5, B-1, B-8, C-10, F-2, F-4, G-9
radar set (RS), 5-13, A-4, B-1, B-7, B-17, F-4, G-8
Patriot support equipment, B-13
medical support procedures, 6-28
METT-TC, 3-5, 3-14, 3-17, 5-1, 5-11, 6-2, A-1, B-3, C-1, F-2, G-4
military decision making process (MDMP), 3-5, D-1
COA analysis, 3-15
COA comparison, 3-15
COA development, 3-7, 3-10, D-13
mission analysis, 3-5, 3-7, 3-8, 3-10, 3-14, D-5, D-10
orders production, 3-17
receipt of mission, 3-5
minimum engagement package (MEP), 3-11, 4-4, F-3
missiles, 1-1, 2-5, 3-13, 4-4, 5-2, 5-11, 5-23, 5-30, 6-15, B-3, D-4
air to surface, 2-2
ballistic, 1-1, 2-1, 5-13, 5-17, 5-21
cruise, 1-1, 2-2,B-7, D-11
theater ballistic missiles (TBM), 1-1, 2-1, 3-8,
missile availability, C-10
missile engagement zone, D-4
mobilization, 4-2
movement, 2-5, 3-5, 3-11, 3-15, Chapter 4, 5-3, 5-6, 6-23, A-2, B-9, C-8, D-6, E-4, F-1, G-1, G-5

## N

named area of interest (NAI), 3-15, 5-5, 5-9, D-15

## O

observation and fields of fire, D-16
obstacles, 6-25, D-6, G-2
offensive operations, 2-1, 5-1, 5-5
operational readiness float (ORF), 6-22, 6-29
operational engagement effectiveness, 3-2, 5-21
operations security (OPSEC), 6-27
operator maintenance, 6-20
organizations and functions, 6-1

## P

Patriot crew responsibilities,
communications operator, B-1, C-4
tactical control assistant, A-4, B-1, B-5, C-4, G-3
tactical control officer, A-4, B-1, B-5, C-4, G-3
tactical director, 5-20, B-1, G-3,
tactical director assistant, B-3, C-4, G-3
Patriot equipment weights, B-14
Patriot missiles, 6-15, B-9, B-12, B-13
ATM, 5-10, B-10, B-13
ATM-1 (GEM), 5-11, B-10, B-13
SOJC, 5-11, B-10, B-13
standard missile, 5-11, B-10, B-13
PAC-3, 3-13, 4-4, 5-11, B-7, B-9, B-13, F-2
Patriot system equipment, Appendix B
planning, Chapter 3, 4-3, 4-8, 5-3, 5-7, 5-14, 6-1, 6-8, 6-30, A-3, B-2, C-1, C-14, F-1, G-1
positioning considerations, 6-10
primary target line (PTL), 3-14, 5-4, 5-6, 5-8, 5-16, G-8
principles, 5-6, 5-21, 5-24, 6-8, 6-27, D-10, E-2
probability of kill (Pk), 3-12, 5-1, 5-9, B-13, G-10

## R

radar set, B-7, F-4, G-7, G-8

reconnaissance, selection and occupation of position (RSOP), 5-3, Appendix G
rear area base security, 6-24
rear area combat operations (RACO), 6-24
rear area protection (RAP), 6-24
reconstitution, 4-1, 4-7, 6-3, 6-20, 6-27, 6-29
responsibilities at battalion level, 6-3, 6-29, C-15, E-1
responsibilities at battery level, 6-28, E-1
recovery and evacuation, 6-21
redeployment, 4-1, 4-7
  assembly areas, 4-7
rehearsals, 3-8, 3-17, 3-18, 6-10
remote launch (RL), 5-1, 5-3, 5-12, G-9
  RL-1, 5-3, 5-11
  RL-3, 3-13, 5-3, 5-11
risk management, E-1
routing logic radio interface unit (RLRIU), C-2, C-15, C-18, C-20
rotary wing aircraft, 2-5, 5-2, 5-13, 5-16, B-1, D-7, D-9
rules of engagement (ROE), 3-1, 5-2, D-3

## S

safety, Appendix E, G-11
secondary target lines, 3-12, 3-14, 5-8, D-7, G-3, G-9
security, 3-17, 5-12, 6-5, 6-10, 6-24, 6-27, A-3, D-18, G-3, G-6
SHORAD, 1-2, 4-5, 5-2, 5-7, 5-13, 5-14, 5-18, C-1, C-11
site determination, 6-29
stability and support operations, 4-5, 4-6, 5-16
standing operating procedures (SOP), 4-4, 6-6, 6-10, E-1, G-1, G-5, G-11
standardization, C-17
supply, 3-7, 4-9, 6-1, 6-3, 6-7, 6-9, 6-11, 6-13, A-3, D-6, G-6
system initialization, C-17

## T

tactical air to surface missile, B-1
tactical ballistic missile, 1-1, 2-1, 2-5, 3-8, 3-10
tactical command system (TCS), 3-5, 3-10, 5-5, 5-13, A-3, B-2, C-6, C-14
  communication plan, 3-12, 3-13, A-3, C-1, C-14
  defense design assessment, 3-15, 3-16, 5-15, B-4
  defense design plan, 3-10, 3-12, 3-14
  TBM defense planning, 3-12
tactical considerations, C-21
tactical equipment, weights, and dimensions, B-14
tactical standing operating procedures (TSOP), C-15
tailored search, 5-9
  default scenario, 5-10
task force, 1-2, 3-11, 3-17, 5-1, 5-11, 5-16, 5-18, 6-5, C-11, E-6
  operations, 6-5
TBM, 1-2, 2-1, 2-5, 3-8, 3-10, 4-6, 5-9, 5-21, D-4
  defense design, D-4
  heavy defense, 5-7
  planning, 3-12
TCA, A-4, B-1, B-5, C-4, G-3
TCO, A-4, B-1, B-5, C-4, G-3
THAAD, 1-2, 3-11, 4-5, 5-1, 5-13, 5-17, 5-21, A-4, C-1, C-11, C-16, E-5
threat, 1-7, Chapter 2, 3-2,3-8, 3-12, 4-4, 5-2, 5-6, 5-16, 5-21, B-1, B-7, D-1, D-10, D-17, G-9
TM defense, 3-6, 3-19, 4-6, 5-3, 5-7
transportation, 4-5, 4-8, 6-2, 6-23, F-1
transportability, 4-4, Appendix F

## U

UHF, 6-11, A-3, B-1, B-5, B-11, C-2, C-7, C-11, C-13, C-19, D-7
unmanned aerial vehicles (UAV), 2-3, 5-13, 5-18

## V

vehicle movement and convoys, E-5, E-8
voice communications, 2-5, B-5, C-1, C-15

## W

wargaming, D-17
warning order (WARNO), 3-5, 3-8, 3-17, 3-16, A-3, G-5
weather analysis, D-6, D-9
weapons of mass destruction (WMD), 2-5
weights and standards, B-1, B-14
weapons of mass destruction (WMD), 2-5

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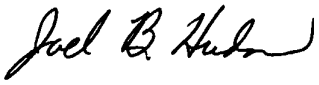

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